Commercial Fisheries Abstracts

a monthly summary of important developments for the fishery industries

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DOUGLAS McKAY, Secretary

FISH AND WILDLIFE SERVICE

JOHN L. FARLEY, Director

Commercial Fisheries Abstracts

Prepared in the Branch of Commercial Fisheries

EDITORS

A. W. ANDERSON, Chief, Branch of Commercial Fisheries

DONALD Y. ASKA, Chief, Educational and Market Development Section

ASSOCIATE EDITOR

MAURICE E. STANSBY, Chief, Pacific Coast and Alaska Technological Research

ASSISTANT EDITOR

ROY C. STEVENS, Fishery Products Technologist, Seattle

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Following is a brief outline of this filing system. The numbers apply to the first digit appearing on each card. For the meaning of subsequent digits, please see the above described leaflet.

0	General and theoretical	5	Vitamins
1	Fish by species	6	Fishery byproducts
2	Fresh fish	7	Analytical Methods
3	Preserved fish	8	Composition
4	Oils	9	Miscellaneous

Issued with the approval of the Bureau of the Budget, December 29, 1953

1.85 METHODS OF SHRIMP AND PRAWN PROSPECTING

Butler, T. H. (Pacific Fisheries Experimental Station, Vancouver, B. C.)
Fisheries Research Board of Canada, Progress Reports of the Pacific Coast Stations, No. 101, 3-5 (December 1954)

During 1954, explorations were made in the marine waters of British Columbia prawn fishing grounds. Since the two most important commercial shrimps, the pink shrimp (Pandalus borealis) and the side stripe shrimp (Pandalopsis dispar), are found on mud bottom at depths ranging between 30 and 70 fathoms, localities with these characteristics were selected for exploration. To be of economic importance, these areas had to be several square miles in size and level enough for trawl fishing. A third commercial species, the prawn (Pandalus platyceros), is found on rocky bottom between 35 and 90 fathoms. This species is fished with traps.

A number of selected shrimp and prawn localities were visited by the research trawler Investigator No. 1 and the chartered trawler Yuri M. If the bottom when explored by the echo-sounder proved to be level mud within the appropriate depth range, a modified box-type otter trawl was set for an experimental drag of 15 to 20 minutes' duration.

At the end of each drag, the catch was dumped into a large fish box. Fish and other marine organisms were removed, and the shrimp were sorted according to species, washed in sea water, and weighed. Eel pout, midshipman, slender sole, rat fish, small non-commercial shrimp, hermit crabs, yellow clams, sea stars, and squid were caught along with the commercial shrimp.

Prawn fishing grounds were also explored by the echo-sounder, and when suitable areas were found, a trap set was fished. Two types of traps were used. Type 1 was a two-tunnel rectangular

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 ABSTRACTER: Martin Heerdt

1.015 FISHERIES OF JAPAN

Sakai, Kenji (Pacific Fisherman, Tokyo)
Pacific Fisherman Yearbook 53, No. 2, 161-171 (January 25, 1955)

Ocean gill-netting. -- The author reports that 20,472,112 salmon of the several species were caught by 205 catcher boats belonging to 7 motherships. The motherships ranged from 3,737 to 8,964 tons. Four of them had canning facilities, and all, except 1, had freezing equipment. In addition to the crew of 35 to 72 men, a mothership was manned with 8 to 18 production supervisors and 80 to 217 laborers.

The catcher boats averaged 60 tons, attained 7-miles-per-hour speed, and had a crew of 17, consisting of a foreman, skipper, chief engineer, 2 oilers, radio operator, and 10 fisherman. In 1953, each boat set 150 to 170 shackles at a time, whereas in 1954, each boat set 200 to 280 shackles.

Crabbing. -- Another Japanese activity in the North Pacific was the operation of a 4,998-ton crab factoryship and 6 trawlers. The trawlers ranged from 56 to 79 tons. In addition, 6 Kawasaki boats of 10 tons each, used for handling tangle nets, were carried on the mothership. Data on the catch are given in the accompanying table.

Bering Sea trawling. -- Japanese trawling in the Bering Sea was started by a new 1,000-ton vessel. A fairly good catch of flatfish, exclusive of halibut, was taken. (Japan abstains from taking halibut under the North Pacific Fisheries Treaty.) Other trawling operations were carried out by 2 motherships, of 8,964 and 7,416 tons, and their accompanying trawlers. About 10,000 tons of flatfish were caught in all.

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 ABSTRACTER: F. Bruce Sanford

1.1 ASPECTS OF 1955 INTER-AMERICAN TUNA RESEARCHES

Schaefer, M. B. (Inter-American Tropical Tuna Commission)
Pacific Fisherman Yearbook 53, No. 2, 133-137 (January 25, 1955)

Inhabiting the seas off the shores of the Americas from California to northern Chile, yellowfin and skipjack constitute the marine resource supporting the most valuable fishery of the eastern Pacific Ocean. The major share of this harvest is now gathered by fishing vessels of the United States. However, it can be expected that Latin American nations will share increasingly in the harvests of the future. Conservation of this fishery is thus international in scope.

At least 80 percent of the tunas taken from the eastern tropical Pacific are captured by the use of live bait fish. These fish are mostly of the anchovy and herring families and are obtained primarily in inside waters. Control of them therefore lies with the nations in whose territorial waters they are found. Since, however, the tuna fishery is so dependent upon the bait fish, the conservation of them is of wide interest.

Tuna Commission. -- The Inter-American Tropical Tuna Commission was established by a convention between Costa Rica and the United States in 1949. The convention contains the provision that other nations having an interest in the fishery may adhere to the convention by a simple exchange of correspondence. Panama adhered in 1953.

The objective of the Commission is to gather and interpret factual information to facilitate maintaining the populations of tunas and bait fishes at levels that will permit a maximum sustained yield. The Commission has no regulatory power

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 ABSTRACTER: F. Bruce Sanford

1.86 THE 1953 JAPANESE KING-CRAB FACTORYSHIP EXPEDITION

Miyahara, Takashi (Fishery Research Biologist, U. S. Fish and Wildlife Service, Seattle)
Commercial Fisheries Review 16, No. 12, 1-12 (December 1954)

This is a descriptive account of the activities of the 1953 Japanese factoryship-expedition for king crabs (Paralithodes camtschatica) in the Bering Sea.

The fleet consisted of the Tokei Maru, a 4,998-ton factory mothership, and of 6 small tangle-net boats and 6 trawlers.

Fishing was begun on April 19, 1953 in the vicinity of Amak Island and proceeded to the areas north of Port Moller, until August 15. During this period 1,276,360 commercial-size male king crabs were caught and canned to produce 58,240 cases (48 6 1/2-ounce cans) of meat.

In the 2 methods of fishing employed, 74.3 percent of the crabs were taken by tangle nets, and 25.7 percent were taken by trawls. The trawling was done with either otter trawls or Danish-seine-type trawls.

Wide variations in the condition of the crabs were observed since the crabs ranged from soft recently-moulted crabs to barnacle- and weed-covered hard-shelled crabs. Variations in weights were also observed. These differences in weight may indicate variations in moulting period or durations, as the female crabs were observed to moult progressively later in the season as the fishing operations moved eastward.

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 ABSTRACTER: Takashi Miyahara

EXPLORATORY FISHING FOR SHRIMP

INTER-AMERICAN TUNA RESEARCHES

JAPANESE NORTH PACIFIC FISHERY

JAPANESE KING-CRAB EXPEDITION

1.1

Ordinarily, need for research on a fishery is not realized until falling catches cause economic distress. The Tuna Commission, however, has been given the rare opportunity of studying the tropical tuna at an early stage in their exploitation. This has made it possible to observe the early development of the fishery and so perhaps to estimate the levels of maximum yields before they are seriously overreached.

One of the research tasks of the Commission has been the collection and analysis of statistical data from which to estimate changes in fishing effort and the associated changes in abundance and yield of the tuna stocks. Fortunately, good historical data are found in the records of governmental agencies, tuna canners,and fishing-vessel operators. Analysis of these data has led to the following tentative conclusions:

1. The fishery for yellowfin has been sufficiently intense to produce notable changes in the abundance of this species. Present levels of yield are near the maximum that can be obtained on a sustained basis. It is possible that the recent fishing intensity may be somewhat greater than that permitting the maximum average sustained catch.

2. Abundance of skipjack is subject to wide fluctuations from year to year. These fluctuations seem not to be related to intensity of fishing. Thus, the large post-war increase in fishing intensity has apparently not produced any great changes in skipjack stocks. The average catch of this species may therefore be capable of considerable increase.

The Commission is working toward an understanding of how and why the tunas vary in their availability from place to place and from year to year. The investigation of these matters requires that the life history of the tunas be worked out, their migrations be charted, their feeding habits be determined, and their abundance be related to the physical, chemical, and biological features of their oceanic environment. A good start has now been made on these problems.

1.85 (Cross Reference: 1.0111)

collapsible trap designed for crab; type 2 was a smaller two-tunnel rigid trap. From 8 to 10 of these traps were baited with scrap fish and set out on a ground line in almost the same way as long-line gear is set out for halibut or dogfish. Submarine ridges or rocky shelves provided the best fishing. In addition to prawns, other animals caught in the prawn traps were pink shrimp, spider crabs, hermit crabs, and large marine snails.

The gear and methods used experimentally were found to be practical for commercial operation, and several new shrimp and prawn grounds were located. The results of this exploratory venture to March 1954 has been reported in Pacific Biological Station Circular No. 31, April 1954. A report to December 1954 will be prepared in the near future.

1.86 (Cross Reference: 1.015)

King crabs in the area explored by this expedition were all of the species Paralithodes camtschatica except for one Paralithodes platypus. A large population of tanner crabs (Chionoecetes sp.) were caught in the vicinity of Amak Island.

All crabs caught were brought to the mothership daily, where they were butchered and cooked as soon as possible. The butchering, cooking, sorting, shaking, and dipping of the meat in brine took place on the upper deck. Baskets of the dipped crab meat were passed below deck, where the meat was graded, cut to size, weighed, and put into cans. These cans were then inspected, sealed, and placed in retorts.

The acid dip commonly used in crab canning was considered to be unnecessary, as the crab were rinsed well in brine.

United States and Japanese fishermen were of the opinion that this season was not typical in regard to weather conditions, localities of crab abundance, and certain other phases of the catch. All agreed that very little is known about this population of king crabs and that better understanding of king-crab biology is needed.

"Kawasaki" boat with load of tangle net-caught crabs

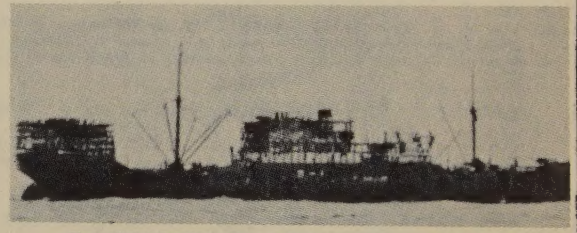

Fig. 1 - The S. S. Tokei Maru, factory-mothership of the 1953 Japanese King-Crab Expedition.

1.015

Super tuna clippers. -- The newest tuna clippers or semi-motherships went beyond the Pacific and into Arabian waters. One of the newly built tuna clippers is said to be the first vessel of this type to be equipped with a variable-pitch propeller. An appreciation of the large size of the Japanese super clippers, which are about 817, 1,200, and 1,856 tons, can be gained by a comparison with the three American clippers of the largest class, which are 509, 691, and 732 tons.

Aleutian whaling. -- In 1952 and 1953, the Baikaru Maru, with a fleet of four catcher boats, caught and processed 1,019 whales. In 1954, the Kinjo Maru and Baikaru Maru, with a fleet of 10 catcher boats, caught and processed 2,216 whales. For the protection of the resource, the Japanese Government will license only one whaling fleet in the Aleutian area during 1955.

Directory. -- The article includes a directory of Japanese fishery agencies and associations.

	1953	1954
Number of King Crabs caught with tangle-nets	948,482	722,428
Rate of catch per shackle of tangle-net	8.2	11.9
Number of King Crabs caught by trawling	327,878	338,386
Rate of catch per haul of trawl net	129.4	161.5
Total number of King Crabs caught	1,276,360	1,060,814
Pack of canned King Crabs, c/s	58,240	59,850
Crabs per case of canned King Crab	21.9	17.7
Average daily pack of canned King Crab, c/s	489	757
Pack of canned "Zuwai" crab, c/s	...	3,457
Total pack, c/s	58,240	63,307
Duration of stay on the fishing ground, days	119	85
Personnel	470	423

2.6 FILLETS GRADED AND PACKED BY COUNT

Young, Leo (Leo Young and Company, New York City, New York)
Quick Frozen Foods 17, No. 7, 72 (February 1955)

Should packers continue to cut and package random-size and odd-weight fillets or should they cut and package uniform fillets?

In discussing this problem, the author distinguished between two kinds of uniform fillets: (1) uniform weight and (2) portion cut. He defines the uniform-weight fillet as a natural fillet; the portion-cut fillet as a manufactured or processed fillet.

Uniform-weight fillet. ---The uniform-weight fillet must also be uniform in size. The author states that, otherwise, the pack will be no better than one of random-cut fillets.

The uniform-weight fillets need not be of exact weight to the ounce, but they should be similar in weight and size -- through careful selection. That is, the fillets should be graded and packed by count or weight as are shrimp, lobster tails, and other fishery products.

This can be done by sorting and grading round fish before filleting and then sorting and grading the fillets before packaging. Thus, fillets of similar size and weight can be packed together, and the cartons can then be marked with the approximate count and weight of fillets.

Portion-cut fillet. -- For certain uses, it is desirable to package portion-controlled, exact-weight fillets. In this type of packaging, fillets should be of identical weight as well as of identical size and shape. Such fillets should be manufactured from large blocks as are fish sticks, and they

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 ABSTRACTER: F. Bruce Sanford

2.115 NEW-TYPE BEACH BOAT

Anonymous
World Fishing 4, No. 1, 10-11 (January 1955)

The Pandora, a small fishing boat for use in inshore potting and lining, was designed for single-handed operation from the beach on Eyme Bay in southwest England. The main aims in the designing of the boat were (1) to dispense with stern gear to avoid risk of fouling lines and to facilitate beaching and launching, (2) to make shallow-draught work easier when potting, (3) to have a vessel that would be capable of giving 5 1/2 knots and that could be operated single-handed, and (4) to leave a comfortable and roomy wheelhouse that would provide protection and clear vision.

The principal dimensions of the Pandora are as follows: length, 21 feet; beam, 8 feet; and draught, 3 feet 6 1/2 inches.

The engine is a diesel that develops 10 h.p. at 1,500 r.p.m. The salient point in her propulsion is a cone propeller, which is actually a form of centrifugal pump. This propeller overcomes the need of stern gear and eliminates the possibility of the propeller shaft becoming out of alignment with the engine as the results of constant hauling up and launching from a pebble beach. Other advantages of the cone propeller are as follows: (1) The complete propelling power can be converted instantly to "pumping out" in an emergency. (2) The cone propeller does not race. (In fact, more thrust is obtained when the vessel is rolling.) (3) The reverse thrust is practically equal to the ahead thrust. (This feature is especially helpful in beach work.)

The Pandora is clinker built, with keel and planks of elm and with stern and deadwoods of oak. Timber and gunwales are of steam-bent American oak; and top strake decks, covering boards, wheel-

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 ABSTRACTER: M. R. Greenwood

2.00 MUSCLE OF AQUATIC ANIMALS

Shimizu, Wataru; Kurokawa, Yoshiaki; and Ikeda, Shizunori
Bull. Research Inst. Food Sci., Kyoto Univ., No. 12, 40-56 (1953)
Chemical Abstracts 48, No. 21, 13121 (1954)

XVII. Imidazole compounds in fish muscles, with special references to the taste of red-muscle fishes. 2.

The ext. of red muscle contained a large amt. of histidine, and the content increased with preservation at lower temps. in parallel to improvement of taste. Yellow-tail contained more histidine and tasted better than mackerel. Carnosine, contained in small amt. in yellow-tail and mackerel, decreased by preservation. When preserved at higher temps., histidine disappeared in a short time while the content of histamine increased. The increase of histamine was larger than the decrease of histidine and this difference was larger with lower temps. of preservation. The amt. of histamine formed paralleled the amt. of volatile base evolved; with lowest temp. the formation of histamine was delayed. This indicates that when fish meat is preserved at low temp., putrefaction does not always cause poisoning. The formation of histamine is suggested to be due largely to bacterial action and, to some degree, to autolysis of meat.

XVIII. L-histidine decarboxylase

The L-histidine decarboxylase in fresh meat of mackerel and yellow-tail showed optimum pH 7.5 and optimum temp. 45°; the optimum pH in the viscera was 6.5. In the course of spoilage of the fish meat, the optimum pH gradually shifted to the acid side, finally to pH 4.5, and the optimum temp.

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2.3 SANITATION ASPECTS OF "TAKE-OUT" TYPE FOODS

Senn, Charles L. and Logan, Paul P. (Los Angeles City Health Department and National Restaurant Association)
American Journal of Public Health 45, No. 1, 33-39 (January 1955)

"Take-out" foods include ready-to-eat dishes that are sold hot, cold, or frozen. They require no further preparation, or require heating only. These take-out foods are sold through food stores and restaurants and are the mainstay of industrial caterers, who serve plants too small to maintain their own cafeterias.

Industrial caterers, who may serve as many as 500,000 persons a day in southern California alone, now serve complete hot meals, hot sandwiches, meat and poultry pies, beef stew, spaghetti and meat balls, baked beans, soups, salads, dairy products, and hot and cold drinks. Since these foods are individually packaged at a central headquarters, no bulk food is served except coffee.

Barbecued poultry and spare ribs are now being prepared in rotisseries on the counters of numerous meat markets and supermarkets.

Cooperative work between the restaurant industry and health officials is resulting in generally higher sanitation standards. The canning, meat, poultry, and dairy industries have done and are doing a good job to insure that their products are wholesome and are processed under sanitary conditions. A similar amount of time and effort to be devoted to the sanitary supervision of take-out foods is desirable.

Research conducted by a medical college in cooperation with the Quartermaster Food and Container Institute illustrates the desirability of developing improved procedures for the preparation of

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 ABSTRACTER: Kathryn L. Osterhaug

2.00

lowered to 32°. These findings indicate that in fish meat autolytic as well as bacterial enzymes are present and that histamine is produced not only by bacterial but also by autolytic action. Some powerful enzyme in the entrails of these fish greatly influenced histamine formation in the meat attached to the entrails during preservation.

2.3

precooked, frozen boned-chicken foods. Studies at one boning plant indicated up to 100,000 coliform and 9,000,000 total count per gram of poultry. In the boned-chicken foods, for example, industry should recognize the following: (1) Various paratyphoid organisms have been isolated from eviscerated poultry. (2) Paratyphoid and typhoid bacilli survive for long periods of time in frozen foods. (3) The botulism organism and its toxin survive indefinitely in frozen foods and remain potent after prolonged freezing.

Failure to recognize these signs of danger and to assure rigid bacteriological control will ultimately lead to difficulty.

An indication of what can be accomplished by high sanitation standards is given by studies on the keeping quality of chicken-a-la-king, including bacteriological evalutaions of processing procedures.

It was found that a product of high acceptability and low bacterial count can be manufactured if good sanitary practices are observed. Comparison of two methods of packaging showed that a substantially sterile product resulted from 'hot filling' at 189° - 212°F. A standard plate count of 4,000 - 6,000 per gram was obtained from 'cold filling' at 55°F. or below.

No less important than plant and product sanitation is the inclusion of positive instructions in readable form with every package of take-out food.

Insofar as possible, the take-out foods should be prepared and processed so that storage at improper temperatures or failure to follow instructions on the labels will not cause illness. The present objective might well be to package these foods at a high enough temperature to destroy nonspore-forming organisms. There is also a need for further studies to be sure procedures adequately protect against botulism.

2.6

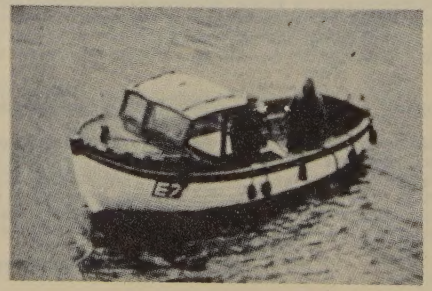
need not retain their original identity. The author states that raw or precooked fillets of this type will find ready acceptance in retail as well as in institutional markets.

2.115

house, thwarts, and seats are of mahogany. The platform bearers are of pine, and the engine box is lined with Acoustipad.

Differences between the Pandora and the conventional type of west country beach boat lie in the canoe stern, rounded stem, and forward set of the wheelhouse.

A line hauler, driven off the main engine, is installed, and she carries a mizzen and an outboard engine for auxiliary motivation.



2.115 THE INSTALLATION OF A UNIT FISH PEN

MacCallum, W. A. (Atlantic Fisheries Experimental Station, Halifax, N. S.)
Fisheries Research Board of Canada, Progress Reports of the Atlantic Coast Stations, No. 60, 7-8 (December 1954)

The trawler Cape Argos recently installed a unit fish pen in its insulated and refrigerated fish hold.

The pen consists of a bottom, middle, and upper section bolted together at the flanged ends of each section (figure 1). These flanges also serve as shelf-board rests or battens. Over-all dimensions of the assembled pen are 3 feet 4 inches by 10 feet 5 inches by 11 feet 2 inches. The sections were constructed from 3/16-inch and 1/4-inch aluminum sheets. Aluminum angles welded to the side walls of each section gave the pen additional structural strength. Aluminum angles form the flanges used to bolt the sections together.

The unit pen in the fish hold aboard the Cape Argos is wedged between neighboring inboard and outboard ship stanchions and mounted on wooden runners to encourage natural circulation of air behind the pen.

This installation shows that the construction of fish-hold pens is feasible and that their installation on a trawler, even in one in which hatch openings are of limited size, is possible. If repairs or inspection require access to the side plates, one or more of the pen sections can be removed with ease.

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 ABSTRACTER: Martin Heerdt

2.116 A REPORT ON PREVENTION OF FISHING GEAR FROM BEING WASHED AWAY BY MEANS OF RADAR WATCHING

Ishida, Masami and Suzuki, Tsuneyoshi (Faculty of Fisheries, Hokkaido University)
Bulletin of the Faculty of Fisheries, Hokkaido University 5, No. 1, 105-108 (May 1954)

Fishing gear within a 3-mile radius of a radar-equipped fishing vessel can now be observed at will. Thus, any gear that begins to drift away from its set position can be recovered before it becomes lost.

If a radar reflector is mounted on one corner of a set of floating fishing gear, the radar scope of the mother vessel will clearly show where the gear is located. The corner reflector that has been used by the authors is an octahedral solid-type cluster. It is made by joining 3 square plates so that they intersect at right angles to each other to form 8 separate compartments (figure 4). When this reflector is mounted so that one corner rests on an elevated pole, a high-intensity reflected signal can be obtained.

Two sizes of radar reflectors were made from 1-mm. hard aluminum sheet metal. One of these reflectors was 15 cm. on a side, whereas the other was 30 cm. on a side. The reflectors proved successful when mounted on drift nets placed in the North Pacific Ocean to catch salmon.

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 ABSTRACTER: Martin Heerdt

2.9 BOTULINUS POISONING FROM FISH

Harmsen, H.
Dtsch. Lebensmitt. Rdsch. 50, 52-54, 97-100 (1954)
Food Science Abstracts 26, No. 5, 512 (September 1954)

Several instances of poisoning with botulinus toxin due to consumption of fish or fish products are quoted. Conditions which favour formation of the toxin are: (1) humidity equal to at least 30% water, (2) anaerobic conditions, sometimes localized in the less permeable parts of the food, and (3) a temperature of 25° to 30° C., but not 37° C., which is too high to permit growth of Bacillus botulinus. A 10% concentration of sodium chloride and pH value below 4 are recommended as preventives. Rapid cooling of cans containing fish is essential, also the maintenance of sufficiently high concentrations of salt and vinegar after these substances have diffused into the fish flesh during preparation of cooked marinades; each 'cooking' should be followed by replacement of the correct amount of salt and vinegar in the liquid. A rancid flavour and odour is characteristic of B. botulinus.

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2.114 REFRIGERATED SEA WATER EQUIPMENT FOR FISH STORAGE ON SALMON TROLLERS

Harrison, J. S. M. and Roach, S. W. (Pacific Fishery Experimental Station, Vancouver B. C.)
Fisheries Research Board of Canada, Progress Reports of the Pacific Coast Stations, No. 100, 3-5 (October 1954)

The latest application of refrigerated sea-water equipment for fish storage on commercial salmon trollers has been the installation of a plywood tank and a sea-water resistant aluminum tank on the troller Phantom II. These tanks have cooling coils mounted on the inside walls. Refrigeration is derived from a 1/2 h.p. Freon-12 condensing unit that is belt-driven from the main engine. The refrigerant cooling condenser is mounted outboard on the side of the ship. When the main engine is not running refrigeration for overnight cooling may be obtained by building up ice on the coils during the latter part of the day.

Temperatures throughout the tanks were found to be variable and not as low as was desired. Therefore, a large belt-driven rotary pump for day operation and a small electric pump for overnight operation were installed to provide for the circulation of water inside the tank. (See schematic diagram.) By having 2 pumps available for circulating sea water, it was possible to provide (1) rapid circulation for chilling of the sea water at the start of the operations, (2) rapid circulation for cooling the fish after catching, and (3) moderate circulation to maintain the temperature during periods of inactivity.

Coho, spring, pink, and chum salmon and lingcod have been held as long as 14 days in refrigerated sea water aboard the Phantom II without any apparent loss in quality.

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 ABSTRACTER: Martin Heerdt

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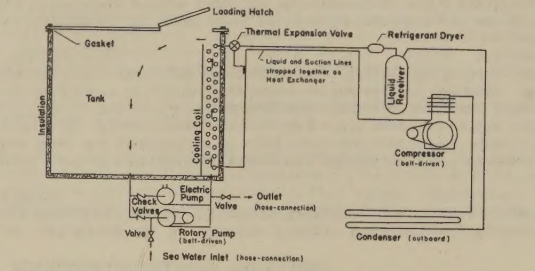
2.114 (Cross Reference: 2.08)

Chilling in tanks may be accomplished at the rate of 50 pounds of fish per cubic foot of tank volume. Each 3,000 cu. ft. of volume requires the refrigeration produced by a 1 h.p. condensing unit. This amount of refrigeration will chill the initial quantity of sea water from 50° to 30° F. in 10 hours. If more rapid chilling is desired, it is of greater economy to add ice and salt at the rate of 400 pounds of ice and 12 pounds of salt per 233 gallons of sea water than to install additional mechanical refrigeration. Under normal fishing conditions and with the water in the holding tank at 30° F., the condensing unit will operate only about 8 hours out of every 24-hour day.

For every 3,000 cu. ft. of cooling-tank capacity, 20 sq. ft. of cooling-coil surface is required inside of the tank and 3 sq. ft. of condenser cooling-coil surface is required on the outside of the vessel. Circulation of sea water at the rate of 15 gallons per minute is required during the initial chilling of the fish, whereas circulation at the rate of 5 gallons per minute is adequate thereafter.



Schematic diagram of refrigerated sea water equipment.

2.115

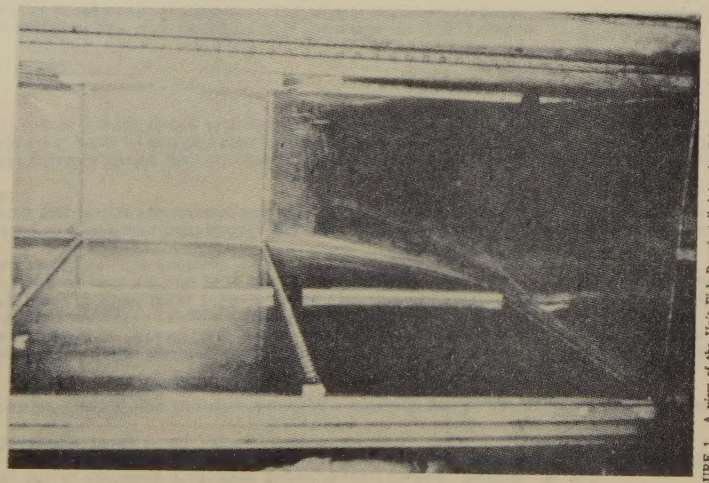


FIGURE 1. A view of the Unit Fish Pen installed in the fishroom of the trawler *Cape Argos* as seen from the "rum".

2.116

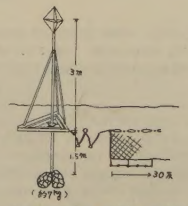


Fig. 4. Reflectorの漁網への装備

3.33 REPORT OF THE LABORATORY OF THE NORWEGIAN CANNING INDUSTRY FOR 1953

Anonymous
Norwegian Canners Export Journal 40, No. 12, 560-569 (December 1954) (In Norwegian)

Handling of raw materials. -- During the year, about 25 lots of fat brisling and 25 lots of thin brisling were frozen, either glazed with water or an algin solution, and stored at -35° C. for 11 weeks. These frozen brisling were then thawed, canned, and held for taste testing at a subsequent date. (This study will be continued.)

Herring packaged in thin tinfoil, polyethylene film, or waxed paper were also frozen for subsequent canning. None of these packaging materials was particularly satisfactory, especially when used in transit. During the year, thawing tests were continued with very small frozen herring. These herring, when thawed, had a softer flesh and, when smoked, fell from the hooks in larger quantities than did fresh herring when smoked. Winter-caught herring that contained large amounts of trimethylamine oxide did not thaw satisfactorily, with the methods used.

Shrimp cooked in fresh water were easier to clean than were shrimp cooked in salt water. It was necessary to use one percent additional salt, when canning shrimp that were cooked in fresh water.

Canning studies. -- Fish balls could not be successfully packed in cans made from electrolytic tinplate that contained 1/4 to 3/4 pound of tin per base box of metal. If tinplate that contained 1 1/4 pounds of tin per base box was used, considerable blackening appeared on the inside of the can. Tunafish in oil could be packed in either lacquered or unlacquered cans made with varying thicknesses of tinplate. It is recommended, however, that tunafish in oil be packed in lacquered cans made from

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 ABSTRACTER: Martin Heerdt

3.249 CHEMICAL CHANGES IN FISH PROTEIN DURING FREEZING AND STORAGE

Seagran, Harry L. (Fishery Products Laboratory, Ketchikan, Alaska)
Commercial Fisheries Review 16, No. 12, 13-14 (December 1954)

The characteristic denaturation of fish protein, with its accompanying effect on texture, which is brought about by freezing and frozen storage is being investigated. Canadian workers have shown that a single protein fraction, actomyosin, loses its solubility in salt solutions, the non-actomyosin fractions remaining unchanged except after very long storage. From these observations, they have developed an objective method for determining the quality of frozen fish. This method consists of extracting the soluble protein and estimating the actomyosin content of the solution. In combination with taste-panel testing, precise work has shown that the actomyosin solubility appears to parallel and anticipate texture and flavor changes, thus providing a measure of the quality of a particular sample of fish. The method, however, lacks precision and provides no information as to the nature of the change involved.

The present phase of the author's investigation of the problem concerns the physical property of viscosity in protein solutions. Because chemical changes in the fish protein alter the shape or size of the huge protein molecules, it is felt that a clue to the extent of these changes is to be found in measurements of the absolute viscosity of a solution of the proteins. To date, the work on the project has been concerned primarily with establishing the nature and magnitude of this property in the native actomyosin fraction from unfrozen fish.

Accordingly, a method has been developed by which actomyosin is isolated from fish muscle and subjected to viscosity measurement, yielding a value that is a function of the asymmetry of the

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 ABSTRACTER: Roy C. Stevens

3.19 RADIATION IN FOOD PROCESSING

Schweigert, B. S. (University of Chicago)
Journal of the American Dietetic Association 30, No. 10, 973-975 (October 1954)

"Cold sterilization" involves irradiating the food primarily by either β rays (electrons) or γ rays (similar to X-rays). As indicated in the accompanying table, the dosage required for sterilization varies widely with the different kinds of organisms.

Beta versus gamma rays. -- Unless very high voltage generators are used, β rays do not have much penetrating power. They are therefore primarily of value for surface sterilization. On the other hand, γ rays can be used for the sterilization of both the surface and the interior.

With machines producing β rays, sterilization dosages (2 to 3 million rep) are achieved in seconds, an advantage in continuous-line operation. The low penetrating power of β rays, however, limits the thickness of the sample. Thus the maximum thickness of a piece of meat that can be sterilized by irradiation from both sides, with a 5-million-volt generator, is 1 inch.

Attention at present has been concentrated on the use of radioactive materials that emit primarily γ rays, such as radioactive cobalt. The source, Cobalt 60, used for experimental work at the University of Chicago consists of a hollow cylinder that has sufficient capacity to irradiate approximately 1/4 pound of meat at a time. A ton of lead is used as shielding. The installation is refrigerated, and the radiations can be carried out at a variety of temperatures. This feature is important, since 18 hours are required to provide a dosage of 1 1/2 million rep.

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 ABSTRACTER: F. Bruce Sanford

3.5 TRACE ELEMENTS AND YELLOW COLORATION IN SALT FISH

Dyer, W. J. and Gunnarsson, G. K. (Atlantic Fisheries Experimental Station, Halifax, N. S.)
Fisheries Research Board of Canada, Progress Reports of the Atlantic Coast Stations, No. 60, 3-4 (December 1954)

Each year, yellow coloration of salted groundfish is encountered somewhere along the Atlantic coast. This coloration, which has not become a serious problem in Canada, has produced almost disastrous results in other parts of the world.

The coloration may be caused by iron contamination in the salt. Although most of the salt used commercially in Canada is free of iron, an occasional lot with sufficient iron to cause trouble does appear on the market.

The coloration usually occurs when the fish are in the pickle or kench. Sometimes the surface of the fish becomes yellow within a few days; at other times, it becomes yellow only after 1 or 2 months. The original color gradually deepens to become a more pronounced yellow that gradually changes to orange or to orange-brown.

Color penetration of the surface is not great, but it depends to some extent on time and the degree of contamination. Although the coloration usually develops uniformly over the entire surface of the fish, it sometimes affects certain areas more than others.

Salt used on fish should not contain more than 30 p. p. m. of iron, if iron staining is to be avoided. Icelandic workers found that salt containing 10 p. p. m. of copper (as copper sulfate), when applied to cod, also gave a typical yellow-brown color. This color gradually became darker with time. Pure

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 ABSTRACTER: Martin Heerdt

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Off flavors caused by irradiation. -- Serious deficiences in the acceptability of the sterilized foods are encountered. With meat, for example, objectionable off flavors, odors, and discolorations occur. In fact, detectable off flavors are produced at radiation levels of only about 5 to 10 percent of those necessary for sterilization.

It will thus be necessary for techniques to be devised that will circumvent these difficulties. Three such techniques have shown promise: (1) the addition of agents, such as ascorbic acid, that are more readily affected by irradiation than are the components of the food product; (2) the use of low temperatures during irradiation; and (3) the avoidance of oxygen in the sample during irradiation. A limitation to the use of these techniques is that, in some cases, those that reduce the undesirable changes also increase the resistance of the microorganisms to the lethal effects of the irradiation.

Effect of radiation dosage on biologic systems

LIMIT	RADIATION DOSAGE
	rep
Limit of safety for man	0.3 (per week)
Lethal for man	800
Lethal for insects	25,000
Lethal for vegetative bacteria	50,000–500,000
Food sterilization (bacterial spores)	1,000,000–4,000,000
Virus, toxin, or enzyme inactivation	more than 5,000,000

3.5

salts containing up to 5 percent added calcium sulfate and calcium phosphate, when applied to cod, did not cause yellow or brown coloration. According to Arnesen, as little as 0.2 to 0.4 p.p.m. copper in salt will cause cod to become yellow in 2 to 8 weeks. A refined evaporated salt containing 3 p.p.m. of copper caused yellow coloration in 3 days and browning in 14 days.

Most solar salts are free of copper, but others contain from 0.2 to 1 p.p.m. and do cause trouble when applied to cod. According to Dunn, commercial refined U. S. evaporated salt averages 3 to 5 p.p.m. of copper. Other salt that caused yellow coloration in Icelandic cod was found to have a copper content of 3 to 5 p.p.m.

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electrolytic tinplate having 3/4 pound of tin per base box of metal. Mackerel boullion should be packed in lacquered cans. Shrimp and crabmeat should be packed inside of paper liners in lacquered cans made from electrolytic tinplate.

Canning of tunafish. -- The most promising bleaching agents for tunafish gave undesirable flavor changes. A practical solution to this problem was not found.

Large tunafish were canned after the flesh had been treated with proteolytic enzymes to render the fish more tender. Increased tenderness was achieved, but the flesh became somewhat granular in texture and developed an unsatisfactory flavor.

Attempts were made to develop new canned products such as tuna in tomato sauce, tuna in mustard suace, tuna stew, tuna with yellow peas, tuna with brussel sprouts and carrots, marinated tuna, and tuna in spiced oil. Tunafish was also packed with rice and various vegetables for use as a complete meal. Smoked and unsmoked herring were packed with various kinds of oil and spice mixtures.

3.249 (Cross References: 3.239, 7.51)

protein molecule. The following points have been established:

(1) the precision of the method,
(2) the effect of time of storage at 0°C. on the actomyosin in the unfrozen muscle,
(3) the effect of time of storage at 0°C. on isolated actomyosin (from unfrozen muscle), and
(4) a function of the viscosity of native actomyosin which can be used as a standard to compare other states of the protein.

Using the protein viscosity measurements and objective methods of texture comparison, the author has a study in progress on the rate and extent of freeze denaturation of actomyosin in fish muscle and its relation to the development of toughness.

3.234 IS SALT A PROBLEM IN BRINE-FROZEN FISH?

Holston, J. (U. S. Fish and Wildlife Service, East Boston, Massachusetts)
Fishing Gazette 72, No. 1, 62-63 (January 1955)

Salt penetration. -- The temperature of the brine and the length of time that the fish are immersed are the prime factors in determining the amount of salt that penetrates into the fish. It might be said that a race occurs between the penetration of salt and the freezing of the outer layers of flesh. The success of brine-freezing processes depends on the rapidity with which the outer layers of flesh are frozen. If the brine is sufficiently cold, the amount of salt that enters the flesh is negligible. Since the rate of freezing is related to the difference in temperatures of the brine and of the flesh of the fish, it is desirable to maintain the brine at as low a temperature as is feasible. However, even when the fish are seemingly completely frozen, salt penetration continues though at a very greatly reduced rate. It is therefore advisable to restrict immersion times to the minimum necessary for freezing. Four hours in cold (5°F.) brine (23 percent by weight) has been found to be sufficient to freeze, without excessive salt penetration, the largest groundfish commonly caught on Georges Bank.

The studies indicated that penetration of salt was almost wholly confined to the first quarter-inch of flesh beneath the skin of the fish. Samples of scrod haddock and of haddock were taken from the various lots of brine-frozen fish brought in by the M. V. Delaware, the Fish and Wildlife Service's experimental freezing trawler, during 6 different cruises. Only routine supervision of brine temperature and of immersion times was made. The tests showed that the amount of salt in the first quarter-inch averaged 1.1 percent. It did not vary much on different cruises.

Water-thawing -- The salt content in the first quarter-inch was markedly reduced during water-thawing of the fish. Scrod haddock and haddock were thawed by immersion in circulating water

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 ABSTRACTER: J. Holston

3.64 DEHYDRATED MEAT

Anonymous
Report of the Food Investigation Board (Great Britain) for the Year 1953, 22-23 (1954)

Storage changes in dehydrated meat in the presence of oxygen are primarily caused by the development of oxidative rancidity in the fat. Irrespective of the presence or absence of oxygen, however, a reddish-brown discoloration and an unpalatable, bitter "roast" flavor develops in dehydrated meat during storage. This roast flavor is the result of a typical browning or Maillard reaction between the sugars and the proteins and extractives.

In pork, fermentable sugar (primarily glucose) varies in quantity from 50 to 250 mg. per 100 grams of lean meat; whereas in other animals, it varies from 20 to 50 mg. per 100 grams of lean meat. In order that the progress of the browning reaction in pork could be followed, minced cooked pork was freeze dried to varying moisture levels and stored under nitrogen at 37° and 50°C. The browning reaction took place at a faster rate in pork containing 40 percent fat and 5 percent moisture (60 percent relative humidity) than in pork containing 40 percent fat and 7.5 percent moisture (70 percent relative humidity). In pork containing 40 percent fat and only 3.5 percent moisture (40 percent relative humidity), browning occurred at a very retarded rate. At 50°, all of the free sugar in pork was used up in 24 hours by the browning reaction.

The addition of sulfur dioxide in the amounts of 100 to 500 p.p.m. of air in the storage room almost completely prevented the browning reaction in meat and dehydrated vegetables for 12 months during storage at 50°. An unpalatable sulfurous flavor remained in this meat on reconstitution and cooking.

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 ABSTRACTER: Martin Heerdt

3.234 SOME PROBLEMS IN THE COOLING AND FREEZING OF FOODSTUFFS

Gane, R. (Low Temperature Research Station, Cambridge)
Chemistry and Industry, No. 4, 78-80 (January 22, 1955)

Whalemeat. -- Meat from whales -- in contrast to meat from mutton, pork, and beef -- can be divided into large uniformly sized and shaped pieces that simplify the freezing technique.

The difference between whalemeat in rigor and whalemeat in post rigor can be determined by its appearance. Prerigor whalemeat is dry, whereas post-rigor whalemeat is wet.

The amount of drip from whalemeat after freezing and thawing may be extremely high. In one instance, the drip from whalemeat frozen in prerigor amounted to 47 percent. (When the frozen meat was allowed to pass through rigor at -3°C., the drip was reduced to 21 percent.) Further loss occurred when the whalemeat was cooked. The total loss due to freezing, thawing, and cooking was 65 percent with meat frozen in prerigor. This loss was only 56 percent if meat that was frozen in prerigor was allowed to pass through rigor at -3°C.

The thermal conductivity of whalemeat containing 0.51 percent of fat was determined to be 0.00306 g. cal./cm./sec./°C. between -10.4° and -13.8°C. Other thermal conductivities determined were as follows: for low-fat-content meat, 0.0033 C.G.S. units between -5° and -90°C., and 0.0014 C.G.S. units between 9° and 20°C.; for high-fat-content meat, 0.0026 C.G.S. units between -5° and -90°C., and 0.0013 C.G.S. units between 10° and 21°C.

Fish. -- If the time for the lowering of the temperature from 32° to 23°F. is not more than 120 minutes, fish are considered to be quick-frozen. Various means are used to achieve this end. Since

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 ABSTRACTER: Martin Heerdt

3.5 THE ARTIFICIAL DRYING OF LIGHTLY SALTED CODFISH

Legendre, R. (Gaspe Fisheries Experimental Station, Grande Riviere, P. Q.)
Journal of the Fisheries Research Board of Canada XII, No. 1, 68-74 (January 1955)

The author attempted to determine optimum conditions for the operation of a fish dryer that would (1) lower the water content of lightly salted fish (Gaspe-Cure type) from 75 percent, wet basis (fish that has lost 25 percent of its original weight), to about 36 percent, wet basis, and (2) produce excellent-quality salt codfish at reasonable cost.

The experiments were carried out in a 250-pound-capacity dryer that could be operated automatically at almost any desired temperature, air velocity, and relative humidity. This work showed that the drying rate increased with an increase in temperature; however, if the temperature exceeded 80°F., damage to the fish resulted. The minimum air velocity for drying lightly salted codfish was found to be 300 to 400 linear feet per minute. The drying rate was influenced most by the relative humidity during the first drying period, but the quality of the product was influenced most by the relative humidity during the last periods of drying (figure 3, over). A relative humidity of 50 to 55 percent, for the first drying period, and of 60 to 65 percent, for the following periods, gave the best results.

The experiments showed that if the drying operation is carried out in several successive drying periods, the drying time can be reduced from 120 to 63 hours (figure 4, over). The first drying period should be continued until the water content of the salt fish has reached about 55 percent, wet basis. Drying can then be completed in successive drying periods of 12 hours each. Press-piling and repiling of the fish between drying periods contribute to better quality.

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 ABSTRACTER: Martin Heerdt

IS BRINE-FROZEN FISH SALTY?

FREEZING WHALEMEAT AND FISH

STORAGE CHANGES IN DEHYDRATED MEAT

ARTIFICIAL DRYING OF SALT CODFISH

3.234 (Cross Reference: 1.95)

fish are irregular in shape, increased efficiency in freezing can be obtained by the use of suitable packages. These packages include rectangular containers for the close packing of fillets or for the packing of unfilleted fish and filling of the spaces with a liquid. In practice, 10 percent water was required to fill the voids in an ice can containing herring, whereas 25 percent water was required to fill the voids in an ice can containing cod. The addition of water to the fish in cans did not change the time required for freezing because the transfer of heat was improved enough to offset the increased freezing load.

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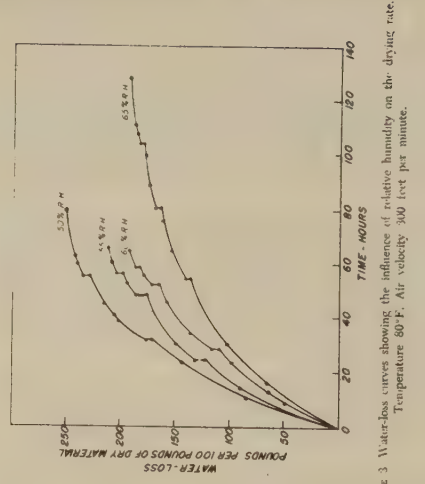

FIGURE 3 Water-loss curves showing the influence of relative humidity on the drying rate. Temperature 80° F. Air velocity 300 feet per minute.

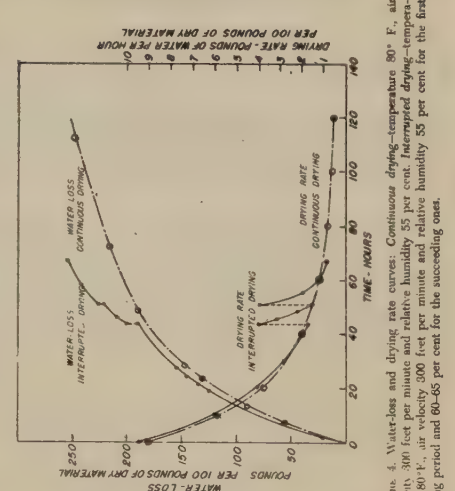
DRYING RATE - POUNDS OF WATER PER HOUR PER 100 POUNDS OF DRY MATERIAL
WATER LOSS CONTINUOUS DRYING
WATER LOSS INTERRUPTED DRYING
DRYING RATE INTERRUPTED DRYING
DRYING RATE CONTINUOUS DRYING
WATER-LOSS
POUNDS PER 100 POUNDS OF DRY MATERIAL
TIME - HOURS

FIGURE 4 Water-loss and drying rate curves: Continuous drying—temperature 80° F., air velocity 300 feet per minute and relative humidity 55 per cent. Interrupted drying—temperature 80° F., air velocity 300 feet per minute and relative humidity 55 per cent for the first drying period and 60–65 per cent for the succeeding ones.

3.234 (Cross Reference: 3.239)

(60° F.) for 90 and for 120 minutes, respectively. During this immersion, a large proportion of the penetrated salt was leached from the flesh. The tests showed that very little salt diffused into the interior of the fish during thawing. Adequate water-thawing processes reduced the amount of salt in the flesh to one-half or even one-third of the amount found after brine freezing.

Salt palatability. -- The most acceptable salt content for palatability of fish fillets was found to be about one percent of the fillet weight. Brine-frozen fish contained very close to this amount of salt in the first quarter-inch of flesh. The remainder of the flesh contained about 0.2 percent salt, the normal value for haddock. After the fish had been thawed in water, the first quarter-inch of flesh contained very little more than the normal value of salt.

Conclusions. -- The work on salt penetration into brine-frozen New England groundfish has shown the following:

1. With only routine supervision of brine temperature and immersion time, salt penetration is not a problem. New England groundfish should be brine frozen by immersion for not over four hours in brine (23 percent by weight) held at +5° F.

2. With adequate thawing processes, what salt does penetrate is, to a large extent, removed by the thawing water.

3. The quantity of salt that is left in the processed fillet is quite acceptable to the consumer.

3.64

Removal of the free sugar before the meat was dried eliminated the browning reaction in dehydrated meat during storage. Several methods were investigated for the removal of this sugar, which is present primarily in the cooking liquor. In method 1, notatin was used to oxidize the free glucose in the cooking liquor; the liquor was then returned to the ground meat prior to freeze-drying. This treatment resulted in a reduction in the amount of browning. In method 2, yeast was used to ferment the free glucose in the cooking liquor. The dehydrated meat that resulted was stored at 50° for 12 months without any deterioration in color or flavor. However, when the meat was reconstituted and cooked, it had a slight yeast flavor.

This work is now in the process of being correlated with fundamental studies concerned with the production of free sugars and sugar phosphate esters in muscular tissue before, during, and after rigor mortis.

4.15 COMPONENT FATTY ACIDS OF INDIAN SHARK LIVER OIL

Pathak, S. P. and Pande, G. D. (Banaras Hindu University, Banaras, India)
Journal of the American Oil Chemists' Society 32, No. 1, 7-9 (January 1955)

The authors studied a sample of liver oil from the Indian shark (Carcharias melanopterus) caught in the Arabian Sea.

In carrying out this study, they adapted Tsujimoto's lithium salt-acetone method for the separation of the highly unsaturated acids from the mixed acids, which were further resolved into simpler groups with the help of Hilditch's modified lead salt-ethanol method. The efficient column (E.H.P.) of Longenecker was employed for fractionation.

The liver oil of Carcharias melanopterus was found to belong to the IV group of Tsujimoto's classification of the Elasmobranch fish liver oils.

In table III, over, the authors give data obtained by themselves and by other workers on the fatty acid composition of various Indian shark liver oils. In table IV, they give data on the average composition of the fats of fish. The authors use these data in their discussion of abnormal saturated acid content.

TABLE IV

Average Composition of the Fats of Fish (wt. %)

Type	Total	Unsat. C_{16}	Unsat. C_{18}	Unsat. C_{20}	Unsat. C_{22}
Fresh water	40	20	40	11	2.5
Boundary	60	15	15	17.5	4
Marine	27	1	25	25	15
		2 - 2.5	2.6 - 3.1	5.5 - 6.5	7 - 15

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 ABSTRACTER: F. Bruce Sanford

4.82 HIGH-FAT, HIGH-PROTEIN BROILER RATION

Anonymous
Feedstuffs 27, No. 6, 1, 79 (February 5, 1955)

In the poultry department of the University of Maryland, a group of 20 broilers averaged 3 pounds in body weight at 7 weeks and 3 days of age and required only 1.64 pounds of feed per pound of gain. This is believed to be a record for feed efficiency.

These results do not necessarily mean that the Maryland rations should be used commercially, for the amount of feed required per unit of gain is only one of the economic factors in the raising of broilers. The work is important rather because of the contribution that it makes to the knowledge of feed formulation.

The Maryland nutritionists had hypothecated that more attention should be given to the level of high-quality protein in relationship to the level of productive energy in high-energy feeds. The experiment was designed primarily to test this relationship.

It is now apparent that the level of balanced protein in feed in relation to the level of productive energy is highly important. The energy content alone is not sufficient to determine the efficiency. It follows that the concept of protein requirements in terms of 20 to 21 percent of the ration is completely inadequate for present-day feeds.

In the experiment, 5 groups of male broilers were used. One group received the Animal Nutrition Research Council (ANRC) tentative standard broiler ration, a feed intended to serve as a comparative standard. The other 4 groups received rations especially formulated for the experiment.

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 ABSTRACTER: F. Bruce Sanford

4.12 COMPARISON OF METHODS FOR DETERMINING FATTY ACID OXIDATION PRODUCED BY ULTRAVIOLET IRRADIATION

Kenaston, Carolyn B.; Wilbur, Karl M.; Ottolengthi, Athos; and Bernheim, Frederick (Duke University, Durham, North Carolina)
Journal of the American Oil Chemists' Society 32, No. 1, 33-35 (January 1955)

Ultraviolet light catalyzes the oxidation of pure unsaturated fatty acids and the lipids of skin, liver slices, and mitochrondria. The extent of such oxidation can be measured by (1) the formation of peroxide, (2) the formation of aldehyde, (3) the degree of conjugation (in the earlier stages), or (4) the colorimetric reaction with thiobarbituric acid (in the case of linoleic and linolenic acids).

This last method is simple and sensitive and it has been used with tissues and with dairy products. Glavind and Hartman compared the thiobarbituric acid (TBA) reaction with the Kreis test for aldehyde and the dichlorophenolindophenol reaction for peroxide on fatty acids from cod-liver oil, methyl oleate hydroperoxide, epihydrin aldehyde, and benzoyl peroxide.

They found that the TBA test paralleled the aldehyde test rather closely but that there was no agreement with peroxide values, as determined by their method. On the other hand, Pool and Prater found a parallel development of peroxides, as determined by Wheeler's peroxide method, and the substance causing the color in the Kreis test.

The authors examined these relationships further in the present study by comparing peroxide, aldehyde, conjugation, and TBA values for linolenate, linoleate, and oleate oxidized by ultraviolet light.

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 ABSTRACTER: F. Bruce Sanford

4.10 THE FATS: A STORY OF NATURE'S ART

Hilditch, T. P.
Journal of the Science of Food and Agriculture 5, No. 12, 558-566 (December 1954)

The kinds and proportions of the various fatty acids that make up the glycerides in a natural fat vary widely, but broadly speaking, there are great similarities in the component acids in fats of related biological origin. Thus, the fats obtained from marine animals, land plants, land animals, and animal milk are found in any one group to possess many broad similarities, whereas each group differs widely from the others. There is considerable regularity in the kinds and, often, in the proportions of fatty acids present in fats from biologically related groups of plants or animals. This regularity is broken by the occasional appearance of an unusual acid or group of acids in the fats of a particular biological family, and sometimes by the presence of one wholly unusual acid in the fat of a species belonging to one biological group.

The component fatty acids of aquatic-animal fats differ greatly from those of land plants and land animals. Oleic acid is the largest individual contributor to all the groups. The saturated acids (mainly palmitic) present in aquatic-animal fats rarely exceeds 15 to 20 percent. The rest of the fats consist of a complex mixture of unsaturated fatty acids containing 16 to 24 carbon atoms in the molecule. The C_{16} acids (mainly monoethenoid) may form from 10 to 20 percent of the total acids. Some polyethenoid (mainly tetraene) C_{18} acids are present, and often fairly large proportions of tetra- and penta-ene C_{20} acids and penta- and hexa-ene C_{22} acids are present. This general type of fatty acid mixture is characteristic of the liver and body fats of all kinds of fish and also of liver, body, and milk fats of marine mammalia such as whales, seals, sea lions, and sea elephants. The proportions of the various fatty acids vary, however, from one group of aquatic animals to another. For instance, the flesh fats of the herring family are especially rich in polyethenoid C_{20} and C_{22}

(over)

 ABSTRACTER: W. N. Sumerwell

4.12 (Cross Reference: 7.871)

The oxidation of methyl linoleate and methyl linolenate irradiated for various periods was measured by analysis of peroxide, aldehyde, conjugation, and TBA chromagen. With increasing periods of irradiation, values obtained by all 4 methods increased in parallel and in direct proportion to the length of irradiation time. Conjugation was almost completely of the dienoic type for both esters.

A comparison of TBA values of linolenate and linoleate for corresponding periods of irradiation shows that the TBA reaction is 60 to 100 times more sensitive for linolenate than for linoleate. Under the conditions of irradiation employed by the authors, the peroxide, aldehyde, and conjugated values of linolenate were about 1.2 to 2.2 times those for linoleate. The authors found that the sensitivity of the TBA reaction for linolenate at any given peroxide value was 30- to 80-times greater than for linoleate. This selectivity of the TBA test confirms earlier findings.

The TBA and aldehyde values for methyl oleate irradiated under the same conditions increased so little that the values, when plotted on the same scale as that for methyl linoleate, lay almost on the abscissa. Peroxide and dienoic conjugation values showed greater increases during the same periods of irradiation. The magnitude of peroxide formation, although small, was such that it could not be attributed directly to linoleate and linolenate present as contaminants (0.02 percent dienoic conjugated acid present).

The authors' experiments have further defined the limits of the TBA test. It is the most sensitive of all the chemical methods used for the oxidation products of linolenic and linoleic acids but, like the Kreis test, is relatively insensitive to the oxidation products of oleic acid.

The values obtained with the TBA test parallel those obtained with the other methods in showing an increased concentration of oxidation products of linolenic and linoleic acids with increase in time of ultraviolet irradiation. Thus, the TBA test, as used on tissues and other biological products, appears to be a reliable method for estimating the oxidation products of linolenic and linoleic acids.

4.10

acids. The liver fats of cartilaginous (Elasmobranch) fish are frequently less unsaturated than are those of the Teleostids, and they often contain some mono-ethenoid C_{24} acid. Fats of fresh-water fish contain more unsaturatdd C_{16} and C_{18} acids and less polyethenoid C_{20} and C_{22} acids (the latter often being very small in amount) than do those of sea fish. The large marine mammals also show, in their fats, characteristic proportions of these various acids, which again differ in detail from those of the various groups of the fish kingdom.

There are in a few instances striking departures from normality in the fats of aquatic animals. For example, the liver fats of one family of tropical sharks contain 40 to 50 percent of saturated acids. The sperm whales store fatty acids in the form of esters of long-chain alcohols (chiefly oleyl and cetyl alcohols). The fats deposited by dolphins and porpoises are unusual in that they contain substantial amounts of isovaleric acid.

(The make-up of seed fats, other plant fats, and land-animal body fats are also discussed by the author.)

4.15

TABLE III

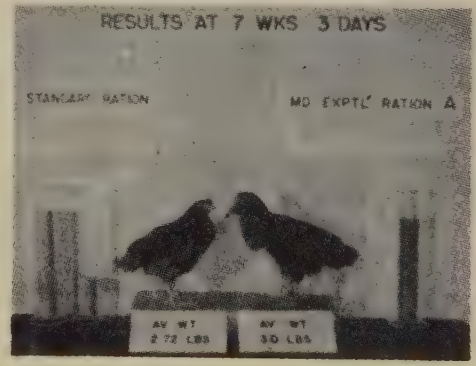
Fatty Acid Composition of Some of the Indian Shark Liver Oils

Acids	Shark liver oil 1 (9). *Galeocerdo rayneri* from Arabian Sea	Shark liver oil 2 (9). *Galeocerdo rayneri* from Bay of Bengal	Saw fish liver oil 3 (10). *Pristis cuspidatus* from Bay of Bengal	Shark liver oil 4 (10). *Carcharias melanopterus* from Bay of Bengal	Shark liver oil 5 (author). *Carcharias melanopterus* from Arabian Sea
Lauric	0.4	.....	.....	.....	Trace
Myristic	3.3	1.5	1.2	3.1	4.4
Palmitic	24.9	23.6	22.9	18.4	18.5
Stearic	11.1	14.5	12.7	9.5	9.0
Arachidic	1.2	0.3	0.1	0.1	1.8
Unsaturated					
C_{12}	0.1	.....	.....	.....	.....
C_{14}	1.1	0.3	0.2	0.8	2.9
C_{16}	11.2	10.9	8.2	10.8	12.7
C_{18}	19.6	23.3	28.5	19.7	20.0
C_{20}	22.3	11.6	16.4	15.2	19.0
C_{22}	4.8	12.2	5.2	17.1	7.3
C_{24}	.....	1.9	4.6	5.3	4.4
Mean unsaturation of					
C_{12}	−2.0	.....	.....	.....	.....
C_{14}	−2.0	−2.0	−2.0	2.0	−2.0
C_{16}	−2.6	−2.0	−2.0	−2.1	−2.1
C_{18}	−3.9	−2.6	−2.2	−3.6	−4.0
C_{20}	−7.0	−5.8	−5.3	7.0	−6.8
C_{22}	−10.6	−8.4	−7.4	−9.0	−9.9
C_{24}	.....	−11.0†	−11.0†	−11.0†	−11.0†

4.82 (Cross References: 4.90, 6.190)

These rations ranged from 906 to 1,240 calories of productive energy per pound of feed, with the ANRC feed being the one containing the lowest energy level.

All diets were relatively high in fat content in that they contained from 10 to 15 percent stabilized yellow animal grease. Protein levels ranged from 21 to 27.1 percent. It was by the use of the most highly concentrated ration (1,240 calories and 27.1 percent protein) that the birds attained the average 3-pound weight at 7 weeks and 3 days of age, with an average total feed requirement of 4.81 pounds.



6.10 PACIFIC COAST BYPRODUCTS IN 1954

Anonymous
Pacific Fisherman Yearbook 53, No. 2, 237-245 (January 25, 1955)

Alaskan herring. -- Only 3 plants went into operation. Two of these were in Southeast Alaska, where the quota was 50,000 barrels. The other plant was in the Prince William Sound area. Good fishing was found here during the early season. However, the late-season fishery again failed to develop.

British Columbia whaling. -- Six killer boats worked out of Coal Harbor on the northwest coast of Vancouver Island. The number of whales killed was 630. Although the market for whale oil continued to be depressed, about 1,000 tons of frozen whalemeat were shipped from Coal Harbor to the United States for mink food.

Puget Sound salmon and bottom fish. -- The good sockeye salmon run to the Fraser River resulted in much offal for Puget Sound and southern British Columbia salmon reduction plants.

Heavy demand by fur farms for bottom-fish offal, however, has virtually eliminated this material from use in the reduction plants in the Puget Sound and Columbia River areas. The offal is usually passed through a grinder and run into 5-wall paper bags, which are then frozen for storage and transportation.

California sardine. -- All sardine products manufactured during 1954 came from cannery offal. The canneries operated under the law that requires the canning of 13.5 cases of sardine per ton of fish received. Actual production was about 20 cases per ton.

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 ABSTRACTER: F. Bruce Sanford

6.193 STATUS OF UNIDENTIFIED VITAMINS

Norris, L. C. (Cornell University)
Feedstuffs 27, No. 6, 22-24 (February 5, 1955)

It is not likely that any of the chick growth factors will be identified in the near future. The most outstanding developments in determining these factors have been made in the procedures for attacking the problem rather than in the differentiation and isolation of the factors themselves.

The present trend in studying the factors is toward the use of diets containing purified ingredients, including purified proteins, instead of simplified diets composed, for the most part, of corn and soybean meal. This use has been found necessary because the small, variable quantities of unidentified factors in the natural products of the simplified diets are the cause of experimental failure. That is, chicks fed these diets grow so well that the increased growth obtained by supplementing the diets with special sources of unidentified factors is not significant.

A typical purified diet is composed of glucose (cerelose), 63.9 percent; purified soybean protein, 14.45 percent; purified casein, 8.95 percent; mineral mixture, 5.0 percent; ground cellophane, 3.0 percent; hydrogenated vegetable fat, 3.0 percent; vitamin mixture, 0.7 percent; DL methionine, 0.55 percent; and glycine, 0.45 percent. Doubling the amounts of trace elements and known vitamins has failed to increase the growth of chicks fed this or similar purified diets. Additional protein or essential amino acids have also failed to increase the growth of the chicks.

Supplementing the purified diet with a mixture of several sources of unidentified factors, on the other hand, has repeatedly increased the gain of chicks from 35 to 50 percent. In a few experiments, gains of about 75 percent have been made.

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 ABSTRACTER: F. Bruce Sanford

6.193 GROWTH PROMOTING PROPERTIES OF DEHYDRATED FISH SOLUBLES IN RELATION TO TIME OF REARING YOUNG STOCK

Johnson, Elton, L.
Poultry Science 33, No. 5, 1063 (September 1954)

Chicks hatched on December 4 and 29 failed to respond to the growth stimulating properties of fish solubles in either the condensed or dried form. Subsequent experiments involving chicks hatched on January 27 and February 25 demonstrated the presence of unidentified factors in condensed fish solubles. A similar growth response was obtained when the solubles were prepared commercially in a dry form on wheat middlings.

The effect of season on the response of chicks to unidentified factors in fish solubles confirms the report by Johnson (Poultry Science 32:930-931, 1953) in studies with Leghorn chicks at the Iowa Station. The present report using different chickens in an entirely different environment presents additional evidence of the probability of depletion of unidentified factors among dams receiving a practical breeder ration as the egg production season advances. The efficacy of fish solubles in dry form to supply the unidentified factors demonstrates that these factors are stable to the conditions of commercial processing involved in producing this type of dried fish solubles.

 Reprinted in whole

6.134 DRY MENHADEN SOLUBLES

Lee, Charles F. (U. S. Fish and Wildlife Service, College Park, Maryland)
Southern Fisherman 15, No. 2, 91-92 (February 1955)

The work reported here has been primarily concerned with condensed solubles dried without additives. As a first step, samples of condensed menhaden solubles were obtained from most of the plants along the Atlantic and Gulf coasts. All but 2 of the samples were then dried without additives on a pilot-plant double-drum dryer at atmospheric pressure.

Requirements for obtaining a dry product were relatively rigid. Usually, the drum speed was 0.5 r.p.m., the space between drums was 0.008 inch, and the steam pressure ranged from 65 to 75 p.s.i. Some adjustment in drum spacing was desirable according to viscosity, and slower drum speeds were required for samples that were difficult to dry.

In operation, enough solubles were poured between the drums to fill the enclosed space more than half full. When this was done, the hot drums boiled off much of the water before the material spread onto the drums, and drying was more efficient.

Owing to this preliminary concentration, oil separation occurred in 20 out of 32 samples. Although some concentrated hot solubles held more oil than did others, separation of oil generally occurred if the sample contained over 5 percent oil.

There was great variability both in drying properties and in characteristics of the dry material. Few samples produced flaky or crumbly dried products. Generally, they were more or less plastic when hot so that the thin layer removed from the drums by the knives tended to thicken into a sheet,

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 ABSTRACTER: F. Bruce Sanford

6.134 (Cross References: 1.2, 8.0)

which often rolled up. Cold texture was somewhat less variable, and the samples were usually brittle enough to grind easily.

In summarizing his work, the author stated that slightly less than half the condensed solubles gave dry products that could be produced commercially. Although there was no high correlation between any single characteristic of condensed solubles and acceptable dry solubles, in general, solubles that had been processed quickly were more desirable for commercial production of dry solubles. They had fairly low levels of free ammonia and were quite viscous. All of the dry solubles without additives would require special packaging to prevent absorption of moisture under humid conditions. It is doubtful if an entirely satisfactory product can be made from unselected pure solubles without additives.

TABLE 1—PROPERTIES OF CONDENSED MENHADEN SOLUBLES

Value	Properties										
	Water	Crude protein	Free[1] ammonia	Oil[2]	Ash	Insoluble matter[3]	Water-insoluble ash	pH[4]	Specific gravity	Refractive index	Relative viscosity[5]
	Percent	Percent	Percent	Percent	Percent	Percent	Percent				
Minimum	46.5	29.0	0.28	1.3	5.5	1.0	0.0	3.24	1.14	1.402	13
Median	48.4	32.7	1.03	7.0	9.2	4.2	0.22	4.82	1.19	1.422	75
Maximum	60.2	40.1	4.19	11.5	18.1	9.2	1.04	6.13	1.26	1.432	3000

[1]Distilled from solubles with an excess of calcium hydroxide.
[2]Oil was determined by Majonnier extraction.
[3]This is material insoluble after treatment successively with hot water, alcohol, and ether.
[4]Five samples were unacidified. Maximum pH of acidified solubles was 5.58.
[5]The values were determined with a MacMichael viscosimeter, and represent rotation in degree of a bob resisted by the torsional stress of a standard No. 26 wire. A stiffer wire was used to determine the high readings, but for comparison all have been converted to the same test conditions.

6.10

During recent years, most of the reduction plants that formerly operated on San Francisco Bay and on Monterey Bay have been dismantled, and the equipment has been shipped elsewhere, notably to South Africa and British Columbia. Recovery of the sardine fishery would therefore require substantial investment in numerous plants.

6.193 (Cross Reference: 7.642)

To get a better conception of the problem, the author and his coworkers studied the supplementary relationship of 4 sources of the unidentified factors. These sources were (1) fish solubles, (2) dried whey, (3) distillers' dried solubles, and (4) grass juice. The average increase in growth obtained with each of the products, when fed alone, was 7.3 percent.

When any 2 products were fed together, the average increase in gain was 24.5 percent. The growth effect of the combined products appeared synergistic, as the effect of the combinations was greater than the sum of the effects of any 2 products supplied separately. When all combinations of these products were fed, the average increase in gain amounted to 31.1 percent. Finally, when all 4 products were fed, the increase in gain was 36.6 percent.

From these results and other work, it was concluded that at least 3 chick growth factors still remain to be identified.

7.81 A MODIFIED CONWAY UNIT FOR MICRODIFFUSION ANALYSIS

Obrink, K. J. (Institute of Physiology, University of Uppsala, Sweden)
Biochemical Journal 59, No. 1, 134-136 (January 1955)

The ordinary Conway unit has been modified by the addition of an outer peripheral chamber that is to be filled with a liquid, which serves as a liquid trap when used with a Petri dish cover (figures 1 and 2). The unit illustrated in figure 2 shows a closing chamber that was made from acrylic plastic and then attached to the unit by a plastic fixative. If a Conway unit is not available for modification, the modified unit with 3 chambers can easily be constructed of another material without a need for grinding any of the surfaces. Glass and porcelain are quite suitable. Not all plastic materials are sufficiently inert for use in the modified Conway unit.

The contents of the closing chamber should be removed by pipet before lifting off the Petri dish. Lifting this dish can be facilitated if it is grasped with a rubber suction cup and lifted vertically. A piece of filter paper should then be placed between the Petri dish and the unit so that it can be set aside without the risk of dropping any liquid into the inner chamber. Analyses are made by the method of Conway (1950).

This modified unit eliminates the possibility of gas leakage. If the liquid in the trap is that used to liberate the volatile substances, absorption is eliminated. Experiments with the modified unit show good results with approximately the same clearance time as with the original units.

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 ABSTRACTER: Martin Heerdt

7.610 COMMENTS ON THE DETERMINATION OF VITAMIN A IN NATURAL PRODUCTS AND ESPECIALLY COD LIVER OIL

Morton, R. A. and Bro-Rasmussen, F.
Chemistry and Industry, No. 3, 60-61 (January 15, 1955)

Vitamin A_2 does not have official recognition; therefore, it is not desirable to express results of spectrophotometric assays in terms of total vitamin A_2. Liver oils from salt fish usually have at least 90 percent of their total activity supplied by vitamin A_1. In this paper the authors have discussed the analytical procedure of the British and U. S. Pharmacopoeias in relation to the newer problems arising out of the presence of 3 vitamin A-active substances in fish-liver oils.

These 3 substances are all-trans vitamin A_1, neovitamin A and vitamin A_2. The geometrical correction procedure which uses the fixation points for all-trans vitamin A_1 overcorrects the neovitamin A contribution to the total absorption. However, this correction is very nearly balanced by the lower biological activity of neovitamin A as compared with all-trans vitamin A_1.

Three cod-liver oils and 2 rich oils were examined by the new chromatographic method of Bro-Rasmussen, Hjarde and Porotnikoff. This method permits a quantitative estimate of the distribution of the total vitamin A absorption at 325 mμ between the 3 active substances. The unsaponifiable fraction of the same oils when determined without chromatography but corrected by the geometrical procedure led to almost the same estimate of total vitamin A_1 potency.

 ABSTRACTER: Martin Heerdt

7.80 RELIABILITY OF TASTE TESTING AND CONSUMER TESTING METHODS. I. FATIGUE IN TASTE TESTING

Laue, Elsie A.; Isnler, Norman H.; and Bullman, Gloria A. (Central Laboratories Division, General Foods Corporation, Hoboken, New Jersey)
Food Technology 8, No. 9, 387-388 (September 1954)

In organoleptic testing, fatigue is characterized by the diminishing ability of a taster to recognize small differences in flavor as tasting is prolonged. Most organoleptic groups recognize the factor of fatigue and provide conditions to minimize its effect. A common procedure is to decrease the number of samples to be tasted at any one trial. It has been suggested that the stronger the flavor and odor, the fewer samples should be tested. For routine quality-control tests where materials are not pronounced in taste or odor, the number of samples may be 3 or more.

Crocker states that recovery to normal sensitivity after stimulation is a matter of minutes. Janowitz and Grossman found that previously ingested substances causing satiety had little or no effect on taste acuity in tests run with sugar and with common salt (sodium chloride) solutions.

The only objective attempt to measure taste fatigue was reported by Helm and Trolle in 1946. They described the effect of running 2 triangular tests in close succession. Three pairs of samples were tested twice in succession by the same panel. The over-all reduction in the number of successes in the second triangular test was found significant at the 4 percent level.

In the authors' laboratory, triangular tests are used extensively for routine difference evaluation of coffee and other products. Two tests are given at one sitting. The samples are presented under conditions that have been found most conducive to taste-test efficiency. These conditions include

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 ABSTRACTER: Kathryn L. Osterhaug

7.70 ARE STANDARDS NECESSARY ON FISH PRODUCTS?

Xavier, M. (National Fisheries Institute, Washington, D. C.)
Fishing Gazette 72, No. 1, 60-61 (January 1955)

Lack of any uniform standards for quality of fishery products has lead to unethical practices and has resulted, in some cases, in distribution of products of inferior quality to the consuming public. Progress in maintaining high quality has not always kept pace with the development of new products and new processing technics.

Four years ago when production of breaded frozen shrimp had only recently got under way, it was found that, in some cases, the breading compound was present at levels exceeding 50 percent of the gross weight. As a result, National Fisheries Institute carried out an examination of selected samples of the production of this industry. The survey showed that the proportion of breading varied between 22 and 62 percent, with an average of 41 percent. In one-quarter of the samples, the weight of breading compound was more than 50 percent of the total weight. In almost half the samples, tests for ammonia indicated that the shrimp had been of inferior freshness when packed. After this early survey was made, the situation deteriorated. Another survey carried out in 1954 revealed that the average breading content had increased from 41 percent to 49 percent. As a result of these findings, the breaded-shrimp industry held a two-day meeting to look into setting up standards for their product. This marks the first time that attempts have been made by the fishing industry to set up voluntary standards.

At the 1952 convention of National Fisheries Institute, a cutting of frozen and canned fish was held. Results of this cutting showed that there was room for improvement in these products. Results of a second similar cutting held the following year showed definite improvement had been made in

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 ABSTRACTER: M. E. Stansby

UNIT FOR MICRODIFFUSION ANALYSIS

FATIGUE IN TASTE TESTING

DETERMINATION OF VITAMIN A

VOLUNTARY FISH-PRODUCTS STANDARDS

7.80

privacy and the control of ventilation, temperature, and lighting.

During a period of 1 1/2 years, the results of 148 double triangular tests on soluble-coffee evaluation were accumulated, compiled, and tabulated into the categories shown in table 1.

It is apparent that there is no question of a lessening in sensitivity due to fatigue in this series.

A series of tests on blended maple syrup was also conducted using double triangular tests. Results of this series are shown in table 2.

The difference in results between the first and second triangular tests was examined by chi squared analysis and found to be significant at the 2 percent level, which definitely suggests that fatigue was operating.

Fatigue seems prominent in the tasting of some types of food products, whereas it is practically negligible in others. Additional objective testing is needed to establish the importance of fatigue in the tasting of other substances.

TABLE 1

Summary of the number of successes and failures in a series of double triangular tests on coffee

Results	First triangle	Second triangle	Both
Successes	856	880	1736
Failures	863	839	1702
Total	1719	1719	3438

TABLE 2

Summary of the number of successes and failures in a series of double triangular tests on maple syrup

Results	First triangle	Second triangle	Both
Successes	97	75	172
Failures	70	92	162
Total	167	167	334

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quality, but a third cutting held in 1954 showed a leveling off or even a drop, in some cases, in quality over the previous year. National Fisheries Institute has set up a Fresh-Fish Committee to stimulate interest and aid in quality improvement in this segment of the industry.

In the newly developed fish-stick industry, considerable interest has been displayed in providing standards. As a result, preliminary work on development of standards for production of blocks of fillets from which the sticks are cut has already been carried out, and investigations are now under way toward establishing standards for fish sticks themselves, including speficiations for breading and for frying oil.

One advantage of adoption of voluntary standards will be that a practical means of determining loan and sales value will be established. Issuance of appropriate certificates based on inspection will result in better agreement between buyer and seller.

The Fish and Wildlife Service, now having Saltonstall-Kennedy funds available, will be in a better position to collaborate with industry in the development of the voluntary standards.

7.81

Fig. 1. Modified Unit with Petri dish and rubber suction cup.

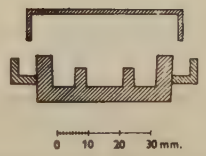

Fig. 2. Cross-section of the Unit and the dish.

8.51 THE SPECIES SPECIFICITY OF MYOGLOBIN

Kendrew, J. C. and Parrish, R. G. (Cavendish Laboratory, Cambridge); Marrack, J. R. and Orlans, E. S. (University of Cambridge)
Nature 174, No. 4438, 946-947 (November 20, 1954)

X-ray crystallographic studies were carried out on myoglobin extracted from the flesh of a number of species of whale, seal, and fish. The myoglobin was extracted from the minced tissue with ice-cold water; other proteins were removed by precipitation with lead acetate. The myoglobin was purified by repeated recrystallization from ammonium sulfate and from concentrated phosphate buffer solutions. Several different types of myoglobin crystals were obtained as shown in table 1. Other X-ray crystallographic data are also tabulated.

The cross-reactions of the myoglobins of the several species with antisera against sperm whale and seal myoglobins were studied by using three different procedures. These experiments resulted in classifying the myoglobins into five groups. These groups ranged from group 1, which reacted very strongly with sperm whale myoglobin, to group 5, which showed no cross-reaction whatever. These groups were as follows:

Group	Sources of myoglobin
1	porpoise, sei whale, and lesser rorqual
2	humpback and blue whale
3	finback whale and dolphin
4	seal
5	tortoise, horse, penguin, and carp

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 ABSTRACTER: M. E. Stansby

8.42 THE SODIUM AND POTASSIUM CONTENT OF BRITISH COLUMBIA SEA FOODS. I. SALMON AND TUNA (IN WATER) CANNED WITHOUT ADDED SALT

Murray, J. F.; Brumwell, C. A.; and MacLeod, R. A. (Pacific Fisheries Experimental Station, Vancouver, B. C.)
Fisheries Research Board of Canada, Progress Reports of the Pacific Coast Stations, No. 101, 17-19 (December 1954)

Low-salt diets to restrict the patients' intake of sodium are frequently prescribed for persons suffering from hypertension. Since an interrelationship between sodium and potassium exists in some biological systems, the response of these people to sodium may be found, at some future date, to be related to the level of dietary potassium as well. The sodium and potassium content of seafoods canned without salt were therefore determined to assist dieticians in formulating low-sodium diets.

The entire contents of each can was homogenized, and a sample was then removed for analysis in duplicate or triplicate. Analyses were made with the aid of a flame-photometer attachment on a Beckman DU spectrophotometer equipped with a photomultiplier. The most satisfactory method of preparing samples for analysis was found to be a nitric acid-solubilization procedure. The average of the analyses of each can sample appears in table I. Values for the sodium and potassium contents of beef, pork, and lamb are also included.

The contribution of each of the readily separable constituents (bones, liquid, and flesh) present in a can of fish in terms of sodium and potassium appears in table II. About 25 percent of the total sodium and potassium in the canned fish is present in the liquid. If the liquid is discarded, a further reduction in the amount of sodium can be obtained.

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 ABSTRACTER: Martin Heerdt

8.51 FACTORS AFFECTING THE FREE AMINO ACID COMPOSITION OF FRESH AND ICED SKELETAL MUSCLE OF NORTH SEA CODLING (GADUS CALLARIAS)

Jones, N. R. (Torry Research Station, Aberdeen, Scotland)
Biochemical Journal 58, No. 4, xlvii-xlviii (December 1954)

Muscle obtained from codling immediately after death was homogenized in a solution consisting of 75 percent ethanol and 25 percent water by volume and then chromatographed as described in 1954 by Jones. Over a period of one year, the average free amino acid composition per 100 grams of codling muscle was 300 mg. taurine, 21 mg. glycine, 15 mg. alanine, 8 mg. glutamic acid, 6.7 mg. l-methylhistidine, 7.1 mg. leucine, 3.5 mg. valine, 1.2 mg. β-alanine, 1.9 mg. aspartic acid, 1.4 mg. serine, 1.9 mg. lysine, 1.2 mg. cysteic acid, >0.5 mg. histidine, a trace of proline, a trace of tyrosine, a trace of phenylalanine, and a trace of threonine. The basic amino acid composition of the codling muscle agreed roughly with the qualitative composition of muscle obtained by Shewan in 1953.

Taurine had a peak value of 350 to 450 mg. per 100 grams muscle in May to July. These values fell to 100 to 150 mg. in December to February. Lysine was below 0.5 mg. per 100 grams for most of the year, but it rose to 12 to 15 mg. per 100 grams in January to February, the spawning period. It is not known to what extent changes of this nature are related to differences in food supply, environmental temperature, sex, and gonad maturation.

The free amino acid composition of the muscle of gutted codling was found to change considerably in storage in ice. The changes during the first 4 days appeared to be caused primarily by leaching with water from the melting ice, by "drip," and by the action of autolytic enzymes. The changes that

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 ABSTRACTER: Martin Heerdt

8.0 A COMPARATIVE STUDY OF FISH MEALS MADE FROM HADDOCK OFFAL

Carver, Joseph H. (Fishery Technological Laboratory, East Boston, Massachusetts)
Commercial Fisheries Review 16, No. 12, 14-16 (December 1954)

A study was conducted (1) to determine the feasibility of preparing meals from fillet frames and viscera from haddock and scrod haddock frozen in-the-round at sea and (2) to evaluate the physical, chemical, and biological properties of the resulting meals. (These fish are normally eviscerated at sea.)

A small portion of the offal (combined frames and viscera) was ground and frozen for the preparation of samples of meal in the laboratory. One group of samples was prepared by drying in an oven with circulating air at 100° C. A second group was prepared by solvent extraction with ethylene dichloride.

The major portion of the offal was divided into two parts and delivered to two commercial reduction plants employing different reduction processes. In the first reduction plant, 15,000 pounds of offal was cooked in a continuous cooker at 40 p.s.i. steam. The cooked offal was pressed to remove the stick liquors and fish oil and was then dried in a flame dryer in which the inlet air ranged from 1300° to 1400° F. In the second reduction plant, 10,000 pounds of offal was cooked in a steam-jacketed batch-type cooker for 6 hours at 100 p.s.i. steam. The cooked offal was then dried in a continuous steam-jacketed vacuum dryer for 45 minutes at 50 p.s.i. steam.

Meal samples were also prepared in the laboratory from the frames of eviscerated haddock that had been iced at sea in the usual commercial manner. The frames were ground and were then dried

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 ABSTRACTER: Roy C. Stevens

8.51 (Cross Reference: 1.5)

occurred after the first 4 days resulted from the added effects of spoilage microorganisms. At 2.5° C., the l-methylhistidine and β-alanine liberated initially by muscle anserinase increased during the first 8 to 10 days to 60 to 80 and 40 to 50 mg. per 100 grams of muscle, respectively. After 10 days, the quantities of l-methylhistidine and β-alanine decreased because of increasing relative activities of other agents. Taurine, which is relatively stable to microbial attack, was progressively leached out of the muscle, whereas lysine increased throughout storage to a value of 40 to 60 mg. per 100 grams after 15 days in ice. After a short initial decrease, values for most of the other amino acids increased for 7 to 15 days, apparently from microbial activity, and then decreased again. The free amino acid content was higher at 0° C. than at 2.5°C., probably because of smaller leaching losses.

When aerated mixed fresh muscle and skin suspensions were incubated at 0°C., a typical marine spoilage microflora developed, and free glutamic and aspartic acids, alanine, β-alanine, lysine, glycine, valine, leucine and l-methylhistidine accumulated. If the bacterial metabolites and byproducts are not removed by leaching, the value of these experiments may be limited.

8.0 (Cross Reference: 1.5)

by each of two methods: (1) in an oven at 100° C., and (2) by the solvent-extraction method using ethylene dichloride.

The data obtained from analysis of the meal samples are shown in the accompanying table.

Samples of the meals have been sent to the Service's Technological Laboratory at College Park, Maryland, for determination of the feeding value of the meals and, particularly, to determine the effect nutritionally of the viscera in the meals. These analyses are soon to be completed.

Table 1 - Yields Obtained and the Proximate Composition of Meals from Haddock Offal

Description of the Samples of Meal		Yield of Meal	Yield of Oil	Composition of the Meal			
Raw Material	Processing Method			Moisture	Protein	Ash	Fat
		Percent	Percent	Percent	Percent	Percent	Percent
Frames from eviscerated haddock iced at sea	Oven-dried at 100° C.	20.6	-	2.1	71.2	23.4	2.9
	Solvent-extracted 1/	19.8	0.75	2.1	73.9	23.6	0.24
Frames and viscera from round haddock frozen at sea	Oven-dried at 100° C.	21.1	-	2.0	53.1	23.9	18.6
	Solvent-extracted 1/	19.8	4.8	4.1	67.6	27.5	1.5
	Commercially continuous-cooked and flame-dried	18.2	2.0	7.9	59.3	26.0	4.9
	Commercially batch-cooked and vacuum-dried	19.5	-	7.3	53.5	23.1	18.9

1/ The solvent used was ethylene dichloride.

8.51 (Cross References: 7.51, 1.95, 0.32)

Relationships between the cross-reactions of myoglobin from the different species, and information available on the chemical structures are considered. Differences in terminal amino acids in the 17,000-molecular-weight myoglobin molecule and in the arrangement of amino acids in the molecule may play a part in determining the cross-reactions.

Table 1. Types of myoglobin crystal

Myoglobin type	Principal type of myoglobin	Crystal symmetry
A	Sperm whale (from ammon. sulph.)	Monoclinic
B	Sperm whale (from phosphate)	Orthorhombic
C	Seal	Monoclinic
	Seal	Monoclinic face-cent.
D	Blue whale	Orthorhombic
E	Blue whale	Orthorhombic
F	Finback whale	Orthorhombic
G	Carp	Orthorhombic

8.42 (Cross Reference: 3.39)

TABLE II—The contribution of bones, liquid, and drained boneless flesh to the total amount of sodium and potassium in cans of salmon and tuna canned without added salt.

Type of fish	Portion analyzed	Sodium	Potassium	Weight of portion	Total contribution to can			
					Sodium	Potassium	Sodium	
		(milligrams per 100 grams)		(grams)	(milligrams)		(%)	
Salmon, sockeye	bones	219	420	1.5	3.3	6.3	4.1	
	liquid	46.5	418	40	18.6	167	23.1	
	flesh	32.7	290	180	58.8	521	72.9	
				Total:	80.7	694.3	100.1	
Salmon, coho	bones	225	584	1.9	4.3	11.1	2.8	
	liquid	83	293	50	42	147	27.0	
	flesh	64	228	170	109	387	70.2	
				Total:	155.3	556.1	100.0	
Tuna, albacore	liquid	57.5	374	37	21.3	139	25.7	
	flesh	37.8	283	163	61.6	461	74.4	
				Total:	82.9	600	100.1	

TABLE I—The sodium and potassium content of fish canned with and without added salt. Values for various meats are included for comparison.

Food analyzed	Sodium	Potassium
	(Milligrams per 100 grams)*	
No salt added		
Salmon, sockeye	344	
	42.2	
	40.1	
	40.9	
	43.9	
	49.2	
	49.6	
Salmon, coho		300
	46.5	365
	46.5	382
	61.5	258
	60.8	—
Salmon, chum	45.0	355
	46.8	336
	52.8	325
Tuna, albacore	27.0	318
	49.0	240
	50.5	269
	53.0	258
Beef** (fresh, lean)	51	360
Pork** (fresh, lean)	58	260
Lamb** (fresh, lean)	78	380
Commercial pack with usual amount of added salt		
Salmon, sockeye	628	308
Salmon, coho	990	277
Tuna, albacore	875	275

* Based on the wet weight of the total can contents.

** Values taken from the literature.

2.1125 STEEL SKIFF FOR PURSE SEINERS

Anonymous
Pacific Fisherman 53, No. 4, 41 (March 1955)

A stock welded-steel skiff built for purse seiners is now available. The skiff has a V-type bottom and can be obtained in lengths of 16, 18, and 19 feet.

The hull is fabricated of 10-gauge alloy steel of a type that gives strength and that furnishes protection from rust and electrolytic action. Further protection is afforded by special painting.

An 18- by 17-inch Michigan wheel gives the skiff power for "towing off." A gasoline engine turns the wheel through a 2.44:1 reduction.

The skiff has a reel for handling the lead, and the power for turning the reel is supplied by means of a take-off from the engine.

(over)

 ABSTRACTER: F. Bruce Sanford

2.115 DRUM SEINER

Anonymous
Pacific Fisherman 53, No. 4, 37 (March 1955)

One of the first boats expressly designed and built for drum seining is now under construction at Bellingham, Washington. The vessel is an "Alaska limit" boat of "longitudinal" steel construction and V-type bottom. Its over-all length is 54 feet 1 inch; its width is 16 feet 6 inches; and its designed draft is 5 feet 6 inches.

A unique feature of the vessel is the arrangement of the drum and table, which are built into the hull, being recessed below the level of the main deck. This lowering of the weight is an important factor contributing to vessel stability.

The drum is firmly fixed to the table and is designed to rotate in such a manner that the purse seine can be completely pursed and brailed on either side of the vessel. The drum has sufficient capacity to handle nets of maximum depth. Both the drum and the table are hydraulically operated.

The seine drum revolves on trunnions bearing on a carriage that might be described as a seine table with a square hole in it for the lower half of the seine drum. This table rotates on a circular track on deck after the conventional manner. Drum controls are carried on the table, and the fairlead and spooling gear are integral with the table and turn with it as it swings to either side of the vessel to recover the net.

The vessel displaces 39 tons. The fuel capacity is 1,520 gallons, and the fresh-water capacity is 300 gallons. The vessel is run by a 150- h.p. diesel engine, which works through a 3:1 reduction to turn a 48-inch wheel.

(over)

 ABSTRACTER: F. Bruce Sanford

2.15 REFRIGERATION OF TUNA AND SARDINES BY SODIUM CHLORIDE BRINES

Farber, Lionel (Fisheries Research Laboratory, Hooper Foundation, San Francisco, California)
Food Technology 9, No. 3, 141-147 (March 1955)

The presently reported work, which was started about 10 years ago, was undertaken to develop the best means of refrigeration of tuna and sardines, using refrigerated brines. Attempts were made to measure the freshness of these fish by using tests for indole, hydrogen sulfide, ammonia, trimethylamine, and carbonyl compounds. Since none of these methods gave satisfactory correlation with organoleptic tests, the volatile-reducing-substances procedure (described in another paper) was developed.

Salt penetration into tuna and sardines held in refrigerated brines was measured. Lowering of the temperature of the brine, of any given concentration, decreased the penetration of salt into the fish.

The nitrogen content of the press juice of fish was measured and was used as a criterion of the degree of denaturation of the protein. Soluble-nitrogen content of press juice was less for frozen fish stored at relatively high temperatures (for example, 20° F.) than at lower temperatures (for example, -5° F.), indicating a greater degree of denaturation at the higher temperatures.

A brine-cooling system for holding sardines or mackerel at 35° to 40° F. is described. The essential feature of the system is a brine spreader inlet pipe at the bottom of each brine tank. The system will hold sardines or mackerel in good condition for many days. Rapid circulation of the brine is essential so that fish in all parts of the tank will reach 40° F. within 2 or 3 hours.

(over)

 ABSTRACTER: M. E. Stansby

1.2 SARDINE SPAWNING IN SOUTHERN CALIFORNIA WATERS

Anonymous
Pacific Fisherman 53, No. 4, 17 (March 1955)

Egg and larvae surveys give a preliminary estimate of 115 trillion eggs spawned off southern California in 1954. This number indicates that about 2.3 billion, or 230,000 tons, of sardines spawned in the area.

Southern California is one of the two main sardine spawning centers. The other center lies off central Lower California. Estimates of the number of eggs spawned in this southern center in 1954 are not complete. However, spawning was as great as, or greater than, in 1953, when about 8.8 billion sardines spawned.

In 1954, the waters off southern California warmed earlier than in 1952 and 1953. Whether or not this fact is related to the sardine reappearance off southern California in 1954 is not known, but the occurrence of contrasting conditions in 1953 and 1954 gives an opportunity to test many hypotheses regarding sardine movements.

It has long been known that sardines move north from Mexican waters to make major contributions to the California fishery. Thus, the increased abundance of sardines in 1954 is not new but is the resumption of a pattern that has been interrupted for at least 2 years. The most important information to be found in the 1954 observations is that the sardine spawning off southern California apparently does not depend on local fish but can result from fish moving in from the south.

The location and number of sardine eggs spawned in the spring and summer of 1955 will be observed in an effort to predict the location and number of fish during the coming fall and winter.

 ABSTRACTER: F. Bruce Sanford

2.15 (Cross References: 2.118, 2.19, 2.3, 2.40, 3.234, 3.249)

The conclusion is reached that, in general, a temperature of 40° F. will prevent bacterial spoilage to a sufficient degree to permit temporary storage of sardines. For the longer storage periods required with tuna, a temperature of 20° F. is required to stop bacterial action. Other changes that occur with tuna held at this temperature (salt penetration, if fish are held in brine, and protein denaturation) indicate that a still lower temperature is desirable.

The following is a summary of the recommended practices for refrigeration of tuna aboard the vessel:

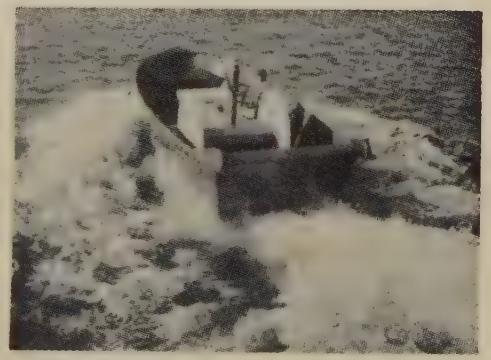
1. Chill tuna in precooled sea water at 29° to 30° F., adding tuna to the brine until the well is full. Maintain at this temperature for 24 hours. (During this time, considerable blood will be removed, which will lighten the color of the tuna meat.)

2. Remove brine completely from stage 1. Add a 20- to 23-percent brine precooled to 0° to -4° F. Circulate this brine at a rate of 10 gallons per minute per ton of fish until the fish are frozen and reach a temperature of 0° to 10° F.

3. Hold frozen fish in the strong brine for at least 48 hours at a temperature of 10° F. or lower. Remove brine and store the fish in dry wells at a controlled coil temperature of no higher than 10° F., preferably lower.

Use of temperatures higher than recommended for freezing tuna will result in the dissolving of considerable protein in the brine. This dissolving of protein can be the cause of large economic losses. Analyses of brines used to freeze fish on commercial tuna vessels showed an average decrease of 935 to 2,185 pounds of protein per vessel. This amounts to an equivalent loss of up to 2 1/2 tons of fish on a single trip.

2.1125



2.115

Designed and Built Specially for Drum Seining

0.32 THE SPECIES SPECIFICITY OF MYOGLOBIN

Kendrew, J. C.; Parrish, R. G.; Marrack, J. R.; and Orlans, E. S.
Nature 174, No. 4438, 946-949 (November 20, 1954)

(Abstract of this article appears under 8.51 page 17)

0.32 DENATURATION OF THE MARINE ANIMAL PROTEIN. I. HEAT-COAGULATION OF WATER-SOLUBLE PROTEIN

Takagi, Mitsuzo
Bulletin of the Faculty of Fisheries, Hokkaido University 1, No. 1, 28-34 (1950)
Chemical Abstracts 49, No. 1, 1113 (1955)

0.32 BLOOD SERUM PROTEIN OF THE MARINE ELASMOBRANCHII

Irisawa, Hirosi and Irisawa, Aya Funaishi
Science 120, No. 3125, 849 (November 19, 1954)

0.33 THE INFLUENCE OF WATER AND pH ON THE REACTION BETWEEN AMINO COMPOUNDS AND CARBOHYDRATES

Schroder, Lawrence J.; Iacobellis, Michael; and Smith, Arthur H.
Journal of Biological Chemistry 212, No. 2, 973-983 (February 1955)

The effect of water and pH on browning and the Maillard reaction was studied by comparing model amino acids and synthetic peptides autoclaved with and without glucose in the dry state and in buffered solutions. It is evident that browning appears to be due to the effect of pH on carbohydrates only and not to the interaction of carbohydrates with amino compounds, whereas this interaction, the so-called Maillard reaction, is limited and takes place in alkaline solutions.

0.33 OCCURRENCE OF THE O-PHOSPHODIESTER OF L-SERINE AND ETHANOLAMINE IN TURTLE TISSUE

Roberts, Eugene and Lowe, Irene P.
Journal of Biological Chemistry 211, No. 1, 1 (November 1954)

A new phosphorus-containing compound, the phosphodiester of L-serine and ethanolamine, has been isolated from turtle muscle.

0.37 THE WATER-BINDING CAPACITY OF DEAD MAMMALIAN MUSCLE. I. THE INFLUENCE OF THE pH VALUE ON THE WATER-BINDING OF MINCED BEEF MUSCLE

Grau, R.; Hamm, R.; and Baumann, A.
Biochem. Z. 325, 1-11 (1953)
Food Science Abstracts 26, No. 4, 374 (July 1954)

THE WATER-BINDING OF MEAT AND ITS ECONOMIC SIGNIFICANCE

Hamm, R.
Dtsch. Lebensmitt.-Rdsch. 49, 153-160 (1953)
Food Science Abstracts 26, No. 4, 374 (July 1954)

THE WATER-BINDING CAPACITY OF MEAT

Niinivaara, F. P. and Ryynanen, T.
Fleischwirtsch. 5, 261-262 (1953)
Food Science Abstracts 26, No. 4, 374 (July 1954)

0.37 THE PROBLEM OF BOUND WATER

Ken'ichi Higashi
Science (Japan) 17, 126-132 (1947)
Chemical Abstracts 45, No. 3, 1175 (1951)

0.5 OSMOPHILISM OF SPORENDONEMA EPIZOUM

Vaisey, E. B.
Journal of the Fisheries Research Board of Canada 11, No. 6, 901 (November 1954)

Shake-culture studies of the fungus Sporendonema epizoum, commonly called "dun," indicated that glucose, sodium nitrate and potassium chloride could replace the sodium chloride generally considered necessary to initiate growth. It was therefore concluded that this organism is an obligate osmophile rather than an obligate halophile.

0.5 THE PROBLEM OF STERILITY OF THE MUSCLES OF LIVING FRESHWATER FISH

Maltschewsky, N. and Partmann, W.
Arch. Mikrobiol. 16, 252-69 (1951)
Food Science Abstracts 26, No. 4, 387 (July 1954)

(Abstract of this article appears under 2.01 page 3 - December 1954 issue)

0.5 STUDIES ON THE COLI-GROUP DISTRIBUTED IN MARINE FOODS II. ENTEROCOCCI IN SQUID (OMMASTREPHES SLOANI PACIFICUS) CAUGHT IN THE SEA NEAR HAKODATE

Tanikawa, Eiichi and Oyama, Akira
Bulletin of the Faculty of Fisheries, Hokkaido University 5, No. 1, 78 (May 1954)

1.0111 THE FISHES OF THE BAY OF FUNDY

Huntsman, A. G.
Contributions to Canadian Biology, No. 3-12, 49-72 (1922)

1.0111 PROXIMATE ANALYSIS OF BRITISH COLUMBIA HERRING IN RELATION TO SEASON AND CONDITION FACTOR

Hart, John L.; Tester, Albert L.; Beall, Desmond; and Tully, John P.
Journal of the Fisheries Research Board of Canada IV, No. 5, 478-490 (February 1940)

(Abstract of this article appears under 8.53 page 9 - March 1955 issue)

1.0111 ANNUAL REPORT OF THE FISHERIES RESEARCH BOARD OF CANADA, 1953

Kask, J. L.
Annual Report of the Fisheries Research Board of Canada for the Year 1953, 185 pages

(Abstract of this article appears under 0.6 page 13 - March 1955 issue)

1.015 OBSERVATION OF JAPANESE HIGH-SEAS SALMON GILL-NET FISHERY OFF HOKKAIDO

Atkinson, C. E.
Commercial Fisheries Review 16, No. 10, 17-19 (October 1954)

(Abstract of this article appears under 2.14 page 19 - January 1955 issue)

1.015 THE 1953 JAPANESE KING-CRAB FACTORYSHIP EXPEDITION

Miyahara, Takashi
Commercial Fisheries Review 16, No. 12, 1-12 (December 1954)

(Abstract of this article appears under 1.86 page 1)

1.015 CEYLON FISHERIES

Lantz, A. W.
Canadian Fisherman 42, No. 3, 16 (March 1955)

1.1 TUNA FISHING AT AMERICAN SAMOA, JANUARY-APRIL 1954

Van Campen, Wilvan G.
Commercial Fisheries Review 16, No. 11, 1 (November 1954)

1.1 CHEMICAL STUDIES ON ATKA MACKEREL MEAT

Fuji, Yutaka
Bulletin of the Faculty of Fisheries, Hokkaido University 5, No. 3, 253 (November 1954)
(English summary, tables and figures)

The writer has studied the chemical properties of the meat of Atka mackeral (Pleurogrammus azonus) from the viewpoints of nutrition or protein chemistry.

1.1 STUDIES ON THE DECOMPOSITION OF ATKA MACKEREL (PLEUROGRAMMUS AZONUS) MEAT. I. ON THE VELOCITY OF BACTERIAL DECOMPOSITION OF ATKA MACKEREL MEAT AND THE LIMIT OF FRESHNESS OF THE MEAT AS THE RAW MATERIAL

Tanikawa, Eiichi; Kawaminami, Fujio; and Yagi, Tadao
Bulletin of the Faculty of Fisheries, Hokkaido University 5, No. 3, 289 (November 1954)
(English summary, figures, and tables)

1.2 PROXIMATE ANALYSIS OF BRITISH COLUMBIA HERRING IN RELATION TO SEASON AND CONDITION FACTOR

Hart, John L.; Tester, Albert L.; Beall, Desmond; and Tully, John P.
Journal of the Fisheries Research Board of Canada IV, No. 5, 478-490 (February 1940)

(Abstract of this article appears under 8.53 page 9 - March 1955 issue)

1.2 AGE AND LENGTH COMPOSITION OF THE SARDINE CATCH OFF THE PACIFIC COAST OF THE UNITED STATES AND MEXICO IN 1953-54

Felin, Frances E.; MacGregor, John, Daugherty, Anita E.; and Miller, Daniel J.
California Fish and Game 40, No. 4, 423 (October 1954)

1.2 STUDIES ON THE HERRING FISHERY BY THE USE OF SQUARE-NETS IN THE SEA NEAR HOKKAIDO. I. ON THE SQUARE-NETS AT YAGISHIRI ISLAND OF HOKKAIDO

Kawasaki, Giichi; Nishiyama, Sakuzo; and Nakamura, Hideo
Bulletin of the Faculty of Fisheries, Hokkaido University 4, No. 3, 239 (November 1953)

1.2 DRY MENHADEN SOLUBLES

Lee, Charles F.
Southern Fisherman 15, No. 2, 91-92 (February 1955)

(Abstract of this article appears under 6.134 page 13)

1.2 THE PACIFIC HERRING

Fraser, C. McLean
Contributions to Canadian Biology, Nos. 3-12, 103-111 (1922)

1.2 LAW WOULD GUARD MAINE SARDINE QUALITY

Anonymous
Canner 120, No. 8, 29 (February 21, 1955)

"The bill greatly increases the authority of the Commissioner of Agriculture to set up and enforce standards of quality and grades for the two and a half to three million cases of sardines packed annually in Maine. It also provides for better state supervision of conditions in the plants, fish handling and other factors involved in the packing operation and would create a seven-man industry advisory committee."

1.5 A PRELIMINARY REPORT UPON THE COMPARATIVE MERITS OF DIFFERENT KINDS OF BAIT USED IN COD FISHING ALONG GASPE PENINSULA

Knight, A. P.
Contributions to Canadian Biology, 23-32 (1912)

Clam was the best bait, herring the next best, and squid the poorest. Fresh clam was better than frozen clam. Similarly, fresh herring was better than frozen herring. When cod are abundant and hungry, dogfish flesh makes a good bait.

1.5 FREEZING AND COLD STORAGE OF PACIFIC NORTHWEST FISH AND SHELLFISH. PART III - STORAGE CHARACTERISTICS OF SIX SPECIES OF OILY FISH

Heerdt, M. and Stansby, M. E.
Commercial Fisheries Review 16, No. 6, 1-5 (June 1954)

(Abstract of this article appears under 3.249 page 15 - October 1954 issue)

1.5 THE "SACRED COD" GOES TO SCHOOL

Anonymous
Practical Home Economics 33, No. 5, 21 (January 1955)

1.5 A COMPARATIVE STUDY OF FISH MEALS MADE FROM HADDOCK OFFAL

Carver, Joseph H.
Commercial Fisheries Review 16, No. 12, 14-16 (December 1954)

(Abstract of this article appears under 8.0 page 17)

1.5 SECTION SAMPLING OF SALT CODFISH FOR WATER CONTENT

Templeman, W.
Fisheries Research Board of Canada, Progress Reports of the Atlantic Coast Stations, No. 60, 15-19 (December 1954)

(Abstract of this article appears under 3.5 page 5 - April 1955 issue)

1.5 SOME FACTORS AFFECTING THE SODIUM CHLORIDE CONTENT OF HADDOCK DURING BRINE-FREEZING AND WATER-THAWING

Holston, J. and Pottinger, S. R.
Food Technology 8, No. 9, 409-414 (September 1954)

(Abstract of this article appears under 3.234 page 3- April 1955 issue)

1.81 REPORT ON SOLIDS IN RAW OYSTERS

Traynor, John P.
Journal of the Association of Official Agricultural Chemists 37, No. 3, 607-614 (August 15, 1954)

(Abstract of this article appears under 7.43 page 7 - January 1955 issue)

1.81 THE ATLANTIC OYSTER

Anonymous
Trade News 6, No. 12, 3 (June 1954)

1.81 THE NUTRITIVE VALUE OF ADRIATIC OYSTER (OSTREA ADULIS)

Krvaric, Mira
Acta Adriat. 5, No. 3, 79-94 (1953)
Chemical Abstracts 47, No. 22, 12684 (1953)

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Archives of Biochemistry and Biophysics
Australian Journal of Marine and Freshwater Research
Biochemical Journal
Bulletin of the Faculty of Fisheries, Hokkaido University
Bulletin of the Japanese Society of Scientific Fisheries
California Fish and Game
Canadian Fisherman
Canadian Journal of Chemistry
Canadian Journal of Technology
Canner
Chemical Abstracts
Chemical and Engineering News
Chemical Engineering
Chemistry and Industry
Commercial Fisheries Review
Commercial Fisherman
Drug and Cosmetic Industry
FAO Fisheries Bulletin
Federation Proceedings
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Fisheries Newsletter (Australia)
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Fish. Res. Bd. Can., Prog. Repts. Pacific Coast Stas.
Fisherman
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Food Engineering
Food Manufacture
Food Packer
Food Preservation Quarterly
Food Processing
Food Research
Food Science Abstracts
Food Technology
Frosted Food Field
Industrial and Engineering Chemistry
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Journal of Agricultural and Food Chemistry
Journal of Applied Chemistry
Journal of Biological Chemistry
Journal of Home Economics
Journal of Nutrition
Journal of the American Chemical Society
Journal of the American Dietetic Association
Journal of the American Oil Chemists' Society
Journal of the Association of Official Agricultural Chemists
Journal of the Fisheries Research Board of Canada
Journal of the Science of Food and Agriculture
Maine Coast Fisherman
Meldinger Fra SSF (Herring Industry, Norway)
Modern Packaging
Modern Refrigeration
National Fisherman
National Provisioner
Nature
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Pacific Fisherman
Pan American Fisherman
Poultry Science
Practical Home Economics
Progressive Fish-Culturist
Quick Frozen Foods
Refrigerating Engineering
Report of the Food Investigation Board (Great Britain)
Science
Southern Fisherman
Trade News (Fisheries Department, Canada)
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World Fishing

Articles chosen for abstracting or inclusion as bibliographical references are those deemed of interest to the commercial fisheries and to fishery technological laboratories. Occasionally pertinent articles from sources other than the above listed publications are included. Biological papers are generally omitted.

3.19 AN EXPLORATION OF THE EFFECTS OF STRONG RADIO-FREQUENCY FIELDS ON MICRO-ORGANISMS IN AQUEOUS SOLUTIONS

Brown, George H. and Morrison, Wendell C.
Food Technology 8, No. 8, 361 (August 1954)

3.19 THEORETICAL CONSIDERATIONS IN FOOD PROCESSING BY GAMMA RADIATIONS. I. CYLINDRICAL ABSORBERS WITHIN A CYLINDRICAL SOURCE

Charm, Stanley E.; Goldblith, Samuel A.; and Proctor, Bernard E.
Food Technology 8, No. 10, 473 (October 1954)

3.19 EXPERIMENT ON THE ANTISEPSIS OF FOODS BY RADIOACTIVE RAYS. PRELIMINARY REPORT -- PRESERVATION OF FOODS BY GAMMA RADIATION. I.

Okada, I.; Osakabe, T. Kikuchi; Fukushima, K.; Yamashita, H.; Akatsuka, M.; Kaneda, Y.; and Watanabe, W.
Bulletin of the Japanese Society of Scientific Fisheries 20, No. 3, 249 (1954) (English summary, figure and tables)

"With 21 curie Co^{60} irradiated "Kamaboko" (fish cake) was maintained in good fresh condition (color, appearance, smell, pH value and acidity) for 7 days at 25 ± 0.5°C. and after storage for 12 days at room temperature."

3.238 STUDIES ON THE MANUFACTURE OF CONSERVATIVE MARINE FOOD PRODUCTS. XII. PRESERVATION OF MARINE FOOD PRODUCTS IN DUPONT PAPER SAC

Tanikawa, Eiichi; Kudo, Ryoji; and Akiba, Susumu
Bulletin of the Faculty of Fisheries, Hokkaido University 4, No. 2, 177 (August 1953)

3.238 RECENT DEVELOPMENTS IN FOOD PACKAGES. II. FLEXIBLE PACKAGES

Riddell, G. L.
Chemistry and Industry, No. 52, 1570 (December 25, 1954)

3.238 F & DA ACCEPTANCE CRITERIA

Lehman, A. J. and Patterson, W. I.
Modern Packaging 28, No. 5, 115 (January 1955)

Basic considerations in determining safety of chemicals used in food-packaging materials.

3.239 CHEMICAL CHANGES IN FISH PROTEIN DURING FREEZING AND STORAGE

Seagran, Harry L.
Commercial Fisheries Review 16, No. 12, 13-14 (December 1954)

(Abstract of this article appears under 3.249 page 7)

3.239 IS SALT A PROBLEM IN BRINE-FROZEN FISH?

Holston, J.
Fishing Gazette 72, No. 1, 62-63 (January 1955)

(Abstract of this article appears under 3.234 page 9)

3.239 SOME FACTORS AFFECTING THE SODIUM CHLORIDE CONTENT OF HADDOCK DURING BRINE-FREEZING AND WATER-THAWING

Holston, J. and Pottinger, S. R.
Food Technology 8, No. 9, 409-414 (September 1954)

(Abstract of this article appears under 3.234 page 3 - April 1955 issue)

3.30 CHEMICAL STUDIES ON THE MEAT OF HOKKI-GAI (MACTRA SACHALINENSIS SCHRENCK). III. ON THE TURBID MATERIAL IN LIQUID OF CANNED HOKKI-GAI MEAT

Motohiro, Terushige and Kamimura, Tsutomu
Bulletin of the Faculty of Fisheries, Hokkaido University 4, No. 2, 169 (August 1953) (English summary and tables)

3.30 STUDIES ON THE MANUFACTURE OF CANNED CRAB. PART 2. THE DIFFERENCE OF QUALITY OF CANNED CRAB MADE FROM DIFFERENT PARTS OF CRAB BODY

Tanikawa, Eiichi; Inoue, Yasunosuke; and Akiba, Minoru
Bulletin of the Faculty of Fisheries, Hokkaido University 4, No. 2, 123-124, 128 (August 1953)

"Canned crab made from white mince or red mince was almost the same as the commercial canned crab, whereas canned crab made from cheliped meat only become soft, the taste was bad, and blue meat was formed. It is better to use sea water or fresh water with added salt. Boiling with the same water must be limited to twice."

3.30 CAUSE AND CONTROL OF THE BROWNING OF HEAT-PROCESSED FISH PRODUCTS

Tarr, H. L. A. and Bissett, H. M.
Fisheries Research Board of Canada, Progress Reports of the Pacific Coast Stations, No. 98, 3-5 (April 1954)

(Abstract of this article appears under 0.33 page 11 - September 1954 issue)

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7.50 SETTING PHENOMENON OF FISH MUSCLE. V. A GRADATION METHOD OF SETTING ABILITY OF FISH MEATS

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7.51 THE SPECIES SPECIFICITY OF MYOGLOBIN

Kendrew, J. C.; Parrish, R. G.; Marrack, J. R.; and Orlans, E. S.
Nature 174, No. 4438, 946-949 (November 20, 1954)

(Abstract of this article appears under 8.51 page 17)

7.51 CHEMICAL CHANGES IN FISH PROTEIN DURING FREEZING AND STORAGE

Seagran, Harry L.
Commercial Fisheries Review 16, No. 12, 13-14 (December 1954)

(Abstract of this article appears under 3.249 page 7)

7.51 CHEMICAL STUDIES ON THE RED MUSCLE ("CHIAI") OF FISHES. II. DETERMINATIONS OF THE CONTENT OF HEMOGLOBIN, MYOGLOBIN AND CYTOCHROME C IN THE MUSCLES OF FISHES

Matsuura, Fumio and Hashimoto, Kanehisa
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The red muscles were found to be considerably richer in these pigments than the ordinary muscles. The deep-seated red muscle, which is found in fishes such as tunny and bonito, contained from 1 to 2 percent myoglobin on a wet basis.

7.51 THE RELATION OF TENDERNESS TO PROTEIN ALTERATIONS DURING POST MORTEM AGING

Wierbicki, Eugen; Kunkle, L. E.; Cahill, V. R.; and Deatherage, F. E.
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7.51 PAPER ELECTROPHORESIS OF MUSCLE PROTEINS. II.

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7.80 COOPERATIVE FISH-PRODUCT-ACCEPTABILITY PROJECT WITH QUARTERMASTER FOOD AND CONTAINER INSTITUTE

Magnusson, Harris W. (U. S. Fish and Wildlife Service, East Boston, Massachusetts)
Commercial Fisheries Review 16, No. 11, 17 (November 1954)

What factors affect the acceptability of fishery products by personnel of the Armed Forces? The answer to this question should point the way to an increased use of fish by the Armed Forces; ultimately, it could result in improvement in the civilian per-capita consumption of fish.

7.80 DETERMINING THE FRESHNESS OF FISH

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